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**THE DOD SCIENCE AND ENGINEERING
APPRENTICESHIP PROGRAM FOR
HIGH SCHOOL STUDENTS**

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**A REPORT
ON THE
SUMMER 1980 PROGRAM**

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**OFFICE OF THE DEPUTY UNDER SECRETARY OF DEFENSE
FOR
RESEARCH AND ENGINEERING
(RESEARCH AND ADVANCED TECHNOLOGY)**

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APPRENTICESHIP PROGRAM FOR
HIGH SCHOOL STUDENTS

A REPORT
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SUMMER 1980 PROGRAM.

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Office of the Deputy Under Secretary of Defense
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Research and Engineering
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FOREWORD

It is with great pleasure that I submit this Report of the Summer, 1980, DoD Science and Engineering Apprenticeship Program for High School students. I am pleased with this initial response and believe that programs such as this will strengthen the pool of technical talent that the United States must have if we are to meet the technological challenges of the future.

I extend my congratulations to the young people who participated in this program, to the mentors who gave of themselves, and to the management and administrative staffs at universities, the laboratories, and in the Military Departments who made the program go. There is no substitute for command attention in the initial phases of a program such as this. I join all of you in the anticipation of continued success in our efforts to stimulate young people to follow careers in defense-related science and engineering.

The assistance of the following individuals in providing data and criticism is gratefully acknowledged: Mr. James Spates, U.S. Army; COL A. Chiota, U.S. Air Force; Ms Jan Hart, Dr. R. Ryan and Mr. W. Cooper, U.S. Navy; and Ms Alice Phillips, editor, of the Naval Ship Research and Development Center.



Albert M. Bottoms

Assistant for DoD Laboratory Management

THE DOD SCIENCE AND ENGINEERING APPRENTICESHIP PROGRAM FOR HIGH SCHOOL STUDENTS

If the United States is to meet the technological challenges of the future, both external and internal, we must actively seek a significant increase in our scientific and engineering manpower pool. Economic forces have recently stimulated undergraduate engineering enrollment, but the long-term prospects for education in science and engineering indicate a level which is dangerously low to support the country's needs. National interest dictates that steps be taken to foster long-term interest in scientific and engineering careers.

In the Fall of 1979, Dr. Frank Press, the Director of the Office of Science and Technology Policy in the Executive Office of the President, proposed that Federal Agencies use their contract research programs to stimulate interest among promising high school students in careers in science and engineering. This proposed program is an outgrowth of a practice that Dr. Press had himself followed during his tenure as Professor of Geology and Geophysics at the Massachusetts Institute of Technology. A key feature of this program is a direct mentor-student relationship, hence the term apprenticeship. In concept, practicing scientists would identify high school students and work with them during the summers and other school vacations to give them an understanding of the scientific method and foster their desire to pursue college level training that would lead to careers in science and engineering.

The thrust of Dr. Press's program concurred in by the Departments of Energy and Agriculture, the National Science Foundation, National Institutes of Health, National Aeronautics and Space Administration, and the Environmental Protection Agency, as well as by the Department of Defense, is toward science and engineering in general. The Department of Defense Science and Engineering Apprenticeship Program, however, emphasizes stimulating young people to pursue careers in defense science and provides employment opportunities in the DoD Laboratories and at institutions that execute contract research for the Military Departments.

Both cultural and economic factors appear to contribute to the underrepresentation of minorities and women in the science and engineering professions. These segments of our population should be a significant potential source of future scientists and engineers. The apprenticeship program is designed to stimulate the interest of minority and women high school students, but the DoD program is not limited to either minorities or the economically disadvantaged.

In 1980 apprentices were recruited through the Army Research Office, the Office of Naval Research, the Air Force Office of Scientific Research, and the in-house Laboratories of the Army and Navy. In 1981 apprenticeship opportunities will also be provided at Air Force Laboratories.

Program Organization

Following Dr. Press's proposal, the Under Secretary of Defense, Dr. William J. Perry, asked that the DoD Program initially be organized by a Department-wide Task Force, co-chaired by the Assistant Secretary of the Army (Research, Development, and Acquisition), the Honorable Percy Pierre, and the Deputy Under Secretary of Defense for Research and Engineering (Research and

Advanced Technology), Dr. Ruth M. Davis, who was succeeded by Dr. Arden L. Bement. Institutional representation on the Ad Hoc Task Force came from the Secretariats and Staff of the Military Departments, the Laboratory Commands of the Military Departments, and the office of the General Counsels of the Military Departments. The Offices of the Assistant Secretary of Defense (Manpower, Reserve Affairs, and Logistics), the Office of the DoD General Counsel, and the DoD Laboratory Management Task Force represented the Office of the Secretary of Defense. The DoD Laboratory Management Task Force provided the Executive Agent for the DoD Apprenticeship Program.

The executive coordinating committee consisted of

Ms M. Kathleen Carpenter, Deputy Assistant Secretary of Defense,
(Manpower, Reserve Affairs, and Logistics) (Equal Opportunity)

Mr. J. Spates, Asst. for Army Laboratories, Office of the Chief
of Staff of the Army

Mr. W. Cooper, Asst. for Laboratory Management, Office of the
Director of Navy Laboratories

Dr. R. Ryan, Office of Naval Research

Ms Jan Hart, Naval Research Laboratory

Col A. Chiota, USAF, Air Force Office of Scientific Research

Mr. C.M. Weatherholt, Office of Asst. Secretary of Defense
(Manpower, Reserve Affairs, and Logistics)

Mr. A.M. Bottoms, DoD Laboratory Management Task Force

This executive coordinating committee took steps to initiate the in-house component of the Apprenticeship Program. Appendix A contains program correspondence. The important initiatives were to obtain approval from the Office of Personnel Management for waiving the means test in the Summer Job hiring authority for the Apprenticeship Program and for lowering the minimum age to 14 (instead of 16) for high school student participants. This latter initiative was taken so that the mentors could encourage young people in their sophomore year of high school to take the proper high school course sequences that would permit admission to college programs in Science and Engineering.

Operationally the Program was decentralized. The DoD target for 1980 was 200 apprentices. The Army and Navy accepted targets of 70 each; the Air Force, 60. The entire Air Force program was executed by the Air Force Office of Scientific Research, although six students were placed at the Air Force Weapons Laboratory in Albuquerque, New Mexico. Details of the Air Force Program are given in Appendix B.

Within the Army, the Army Research Office recruited 58 mentors and apprentices through the contract research program at several universities. The Army in-house laboratories recruited 30 students and mentors. Details of the Army Program are given in Appendix C.

With a target of 70 apprentices, the Navy recruited 131 mentors and students, with another 18 ready to start in the Fall of 1980. There were three components of the Navy program: the Office of Naval Research (ONR) (10), the Naval Research Laboratory (NRL) (28), and the Navy Laboratories of the Naval Material Command (93). Half of the NRL apprentices belonged to a selected group of gifted high school students participating in an annual training program sponsored by the National Science Foundation through American University. See Appendix D for detailed reports on the Navy Program.

The DoD total as of the Fall of 1980 is 299 apprentices. Late returns from the Army Laboratories will raise that number.

ENTRY, DURATION, FOLLOW-ON OPPORTUNITIES

Entry. Most research activities have arranged for local high schools to refer promising candidates for apprenticeships. Apprentices normally are hired directly by the research activity using special authorities established by the U.S. Office of Personnel Management (OPM).

- o The "High School Co-op Program" authorizes Federal agencies to employ students directly. It is described in the Federal Personnel Manual (FPM) Chapter 213 and provides a special appointment authority, excepted from the regular civil service, a test or examination is not required. The specific authority is known as "Schedule A, 213.3102 (q)."

- o Similar excepted service authorities that apply to the Federal Stay-in-School Program or the Federal Summer Aid Program also may be used. They are known as "Schedule A, 213.3102(v)" and "w" authorities. They are described also in FPM Chapter 213. For this program, the Department of Defense (DoD) has received a special waiver from OPM for certain restrictions that would normally apply. The restrictions that were waived for employment in the Research Apprenticeship Program normally require candidates to meet certain economic need criteria and recruitment for jobs in these programs is limited to referrals by State Employment Service Offices. The waiver granted by OPM allows the use of these two appointment authorities without regard to family income, and allow recruitment contacts with schools.

- o In some cases, apprentices may be assigned as volunteers, without pay. Volunteer service is especially appropriate for those just starting high school, and others whose education has not yet prepared them for performing productive work.

- o As an additional aid in special cases, OPM has allowed the waiver of the minimum age for employment. Under this provision students as young as 14 may be employed, subject to any State or local laws that may apply to youth employment. This waiver was granted by OPM for use only in the Research Apprentice Program. It may not be used for any other youth employment program.

In some cases where much of the DoD activity's research work has been done by a university or corporation under contract arrangements have been made for the contractor to employ Research Apprentices. The contractor should be allowed flexibility to set pay rates and conditions of employment that are consistent with the treatment of other employees.

Duration. Apprenticeships may be extended through the summer after graduating from high school. Each appointment authority contains certain features that must be observed.

- o Stay-in-School. Work periods may not exceed 20 hours per week.

- o Summer Aid. Stay-in-School appointees may be converted to the Summer Aid authority at the end of the school year. Allowable work periods are extended to full time.

o High School Co-op. Total time worked during any 12 month period may not exceed 1,040 hours.

Follow-On Opportunities. Perhaps the most familiar follow-on program for interested apprentices, when high school is completed, is the Cooperative Education Program for Baccalaureate Students. Many research activities have Co-op Education agreements with participating universities which provide work periods tailored to the student's classroom work. Activities that do not have an active Co-op Education Program may want to consider the possibility of establishing one. All DoD Civilian Personnel Offices have the necessary information to advise Laboratory Managers on how to develop such a program.

Some other follow-on opportunities include:

o Reserve Officer Training Corps (ROTC). The military services offer full education programs in conjunction with certain universities. The student's educational program must be devoted to certain professions and he or she is obligated to a period of military service upon graduation. Recruiting officers for any of the military services can provide further information of this and similar programs that can lead to a challenging, professional career in the Army, Navy, Marine Corps or Air Force.

o Federal Junior Fellowship. Federal Junior Fellows are hired with the exceptions that they will return to work each summer and vacation period throughout their undergraduate study. Part-time work during the school year is not provided through this program as it is through the Co-op Program. Candidates must be in the upper 10% of their graduating high school class, need an income in order to attend college, be interested in a Federal career upon graduation, and be nominated by their high school.

o College Level Summer Employment Program. Many activities offer summer employment for college students who are pursuing degrees in scientific, professional or technical fields. Students may be employed up to a maximum of 1,040 hours per year, up through graduation. See OPM Announcement 414-Summer Jobs.

Because of the shortage of applicants in many scientific and technical fields, OPM has relaxed the examination and competitive requirements for appointment to the civil service. Many DoD research activities have continuing recruitment needs for graduates with degrees in science and engineering, and will be able to extend job offers to graduates. Those who graduate through the Baccalaureate Co-op Program or the Federal Junior Fellowship Program may be converted to a regular civil service appointment upon graduation without further competition.

PARTICIPATION

The program reached the target segments of the population. Information available in the Fall of 1980 shows the following distribution:

Air Force:	61	all minority or female
Navy	ONR 10	all minority or female
	NRL 28	7 female, 8 minority
NAVMAT	111 86	minority, 49 female
Army:	88	Predominately minority or female (precise numbers not available Nov 80)

DoD, with its 73 in-house laboratories and hundreds of contract research centers, has the potential to reach every part of the United States and its possessions. The geographical distributions was as follows:

Air Force:	Ohio, New Mexico, Alabama (Students at 500 high schools were contacted.)
Navy:	Rhode Island, Connecticut, Virginia, Maryland, Florida, California, Oregon, District of Columbia, Louisiana, Pennsylvania, Guantanamo Bay, Cuba
Army:	Maryland, Virginia, Oklahoma, Michigan, New Jersey, Kentucky, Massachusetts, New York, Pennsylvania, Illinois, Ohio, Alabama, Texas

Follow-Up

In general, follow-up of individual students is the responsibility of the unit providing the apprenticeship. The contractors for the Army Research Office, the Naval Research Laboratory, and the Air Force Office of Scientific Research maintain contact with students to see whether they do indeed pursue college level training in science. Institutions and the mentors are strongly encouraged to maintain continuity with apprentices through the apprenticeship proper or other federal programs.

Compensation

Apprentices directly employed by the in-house laboratories received the minimum wage. Those employed through contractors and at Universities usually received a stipend or grant that was keyed to prevailing rates for undergraduate assistants.

PROGRAM VALUE AND ACCOMPLISHMENTS

It is too early to know how many apprentices will actually pursue careers in science and engineering. It will be five years or more before many of this year's group of apprentices will be available to defense laboratories or contractors.

Mentor evaluations of the students were enthusiastic. The screening processes resulted in the selection of students who, for the most part, had the potential and motivation to succeed in science. Mentors in the in-house laboratories expressed satisfaction with the work accomplished. Much of it was deemed valuable to the missions of the laboratories, particularly at the Naval Research Laboratory where each student prepared a written report and presented an oral report to an American University panel. Prospective mentors who did not participate in the Summer 1980 program were applying to take part in Summer 1981.

Comments from apprentices indicate that they benefited from the learning experience. Individual arrangements have been made between apprentices and mentors to keep in contact during the academic year. (This is particularly important when the apprentice has no role model in science and engineering in his ethnic or peer group.)

Princeton University wants to copy the Army program.

Examples of projects performed and instructions received by the mentors are provided in Appendixes B, C, and D.

EVALUATION AND RECOMMENDATIONS

A new program such as this requires virtually constant headquarters attention. The success of the program in the Air Force, the Navy Laboratories, and at the Army Research Office attests to the management leadership in those organizations.

Reliance on local recruiting of apprentices is a viable approach. It is necessary, however, to make sure that the hiring authority is understood by the personnel departments at the local levels.

Some confusion remains at government R&D Centers about the several programs that seem to have roughly the same objectives. A brochure will be prepared which describes the various programs.

So far, the program has been limited by resources available. In 1980 there were more qualified students and potential mentors than we had resources to sustain.

There may be conflict with some state laws, particularly those relating to child labor. However, training and educational programs are usually exempted.

The NRL program showed the value of centralized direction of both mentors and apprentices. At laboratories with several apprentice-mentor pairs, a technical person should coordinate with professional aspects of the program and a personnel specialist should manage the hiring and other administrative details. Both activities are essential to program success.

DoD experienced no difficulty in making the existence of the Apprenticeship Program known. The DoD press release (Appendix A) was broadly disseminated.

Future DoD programs should be coordinated with similar programs of other agencies, since more complete geographical coverage can be obtained if a prospective applicant can be matched with a laboratory or university apprenticeship opportunity near his home.

It was, and presumably will continue to be, necessary to monitor progress of this program to mitigate legal and regulatory barriers which delay the achievement of program objectives.

Ultimate success of an ongoing program depends on assurance of continued financial support early in each fiscal year so that appropriate commitments can be made to mentors and apprentices.

PLANS FOR FUTURE

When the DoD Science and Engineering Apprenticeship Program for High School Students was announced in the Fall of 1979, we set a target of 400 apprentices for Fiscal Year 1981. The response that we experienced in FY80 leads us to believe that the program could easily accommodate 600 students and their mentors -- probably more -- given adequate resources.

The 1981 Program is underway. Preliminary reports are that the goal is to recruit about 400 apprentice-mentor pairs. As in 1980, the program is decentralized with each host institution carrying out the functions of recruiting, providing compensation, developing enrichment programs for the apprentices, and maintaining records on accomplishment and future activities of the Apprentice in Science and Engineering.

APPENDIX A

CORRESPONDENCE AND PRESS RELEASES

This Appendix contains copies of the major correspondence and press releases pertaining to the Summer, 1980 Program

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

MEMORANDUM FOR: DOD: Bill Perry/Al Bottoms
DOE: Ed Frieman/Jim Kellett
NIH: Don Frederickson/Doris Merritt
NSF: Dick Atkinson/George Pimentel
USDA: Anson Bertrand
EPA: Steve Gage
NASA: BoB Frosch/Al Young

FROM: Frank Press

RE: Research Apprenticeships for Minority High Schoolers

As you know from Gil Omenn, all of your agencies have responded favorably to the Administration proposal to launch a program of apprenticeships in research laboratories for minority high school students, beginning in the summer of 1980. There is strong support for this program in the White House, and assurances from OMB of additional budget for the program in FY81.

The objectives are to stimulate broader interest in the minority communities in careers in science and engineering and to establish individual working relationships of students with active researchers who may become helpful mentors when students need advice on college and careers and need letters of recommendation. The Nation's and Government effort to recruit and sustain minority students in science and engineering fields seem to have plateaued. We are hopeful that this program, in addition to the many programs your agencies already support, will make a difference.

The numerical goal for summer 1980 is to employ at least 1000 students through this mechanism. In discussion with agency staff, we have agreed that the distribution should be 200 through DOD, 200 through DOE, 200 through NIH, 200 through NSF, and 75-100 each through USDA, NASA, and EPA. The mechanism will require that individual researchers or group of researchers submit a supplemental request to existing or pending research grants and contracts. The request should state within two pages the type of work experience that can be offered, the routes through which interested youngsters will be sought in local or other high schools, and especially the activities that will be organized to provide educational enrichment beyond the work itself. The youngster will be paid a stipend roughly equivalent to what would be earned at the minimum wage, i.e. \$1000-1250 for a summer or for a summer plus some part-time work during the school year. In addition, depending upon the enrichment activities specified, the agency will provide up to \$1250 for the researcher to use himself or use to purchase time and effort from a graduate assistant or a high school science teacher to organize enriching educational activities for the student or for a group of students in the research department. The researcher and the student would be expected to submit a brief evaluation of the experience, to guide assessment of the program.

The budget impact of this program for FY80 is estimated at approximately \$2500 per student. Thus, DOD, DOE, NIH, and NSF will need to re-program approximately \$500,000 and USDA, NASA, and EPA about \$250,000. In return for this cooperation in FY80, OMB has assured me that new funds sufficient to double the program in each participating agency will be provided for FY81, allowing a program with 2000 youngsters and requiring \$5 million.

Please notify me or Gil Omenn (456-7116) about the details of your plans to implement the program. We want to announce the program from the White House, with appropriate materials to direct interested researchers and interested individuals and organizations from the minority communities to appropriate agency contacts. We want to be prepared to make the announcement by December, and we plan to highlight this program at the Annual Meeting of the National Advisory Council on Minorities in Engineering at the National Academy of Sciences February 13, 1980. We welcome your advice on the best ways to stimulate interest from high schools and from the students themselves.

cc: John While
Hugh Loweth
Suzanne Woolsey

NO. 92-80
Oxford 73189 (Copies)
Oxford 50192 (Info)

IMMEDIATE RELEASE

March 13, 1980

SCIENCE AND ENGINEERING APPRENTICESHIPS AVAILABLE TO HIGH SCHOOL STUDENTS WHO HAVE ABILITIES TO ENTER SPECIAL DEFENSE DEPARTMENT CAREERS

The Department of Defense is participating in a special program to provide scientific apprenticeships to high school students. The program is designed to have special appeal to minority and women students interested in careers in the science and engineering professions.

The minimum goal for the summer of 1980 is 200 apprentices who will study and work with a professional mentor in either DoD contract research establishments or in the DoD laboratories. The program will be administered by the individual Military Departments.

The DoD point of contact for this program is Mr. Albert M. Bottoms, care of Deputy Under Secretary of Defense for Research and Engineering (Research and Advanced Technology), Room 3E114, The Pentagon, Washington, D.C. 20301, (telephone (202) 694-4779).

Following are the programs and points of contact in the Military Services:

Army

The program will be conducted at the Army's research and development laboratories located in the United States. Also, Army not-for-profit contractors, mostly universities, will participate on a volunteer basis, thus broadening the geographic locations for potential apprenticeships. The Army expects to identify these locations by the end of March and apprentices by the summer.

The program will be administered by the U.S. Army Materiel Development and Readiness Command, the U.S. Army Medical Research and Development Command, the U.S. Army Corps of Engineers, and the U.S. Army Institute of Behavioral and Social Sciences.

Army officials will be seeking recommendations of possible apprentices from high school administrators, based on the students' demonstrated ability in science and engineering fields, participation in extracurricular activities related to science and engineering, and scholastic achievement.

Initial information will be available in early April from Commander, U.S. Army Research Office, P.O. Box 12211, Research Triangle Park, N.C. 27709.

Navy

The program will be conducted at the Navy's research and development laboratories located in the United States. In addition, a limited number

of Navy research contractors, mostly universities, will participate on a volunteer, non-profit basis, thus broadening the geographic locations for potential apprenticeships. The Navy expects to identify these locations by the end of March and apprenticeships by the summer.

Navy laboratory officials will be seeking recommendations of possible apprentices from high school administrators, based on the students' demonstrated ability in science and engineering fields, participation in extracurricular activities related to science and engineering, and scholastic achievement. Initial information will be available in early April from the Director of Navy Laboratories, Department of the Navy, Washington, D.C. 20360, or the Director, Research Programs, Office of Naval Research, Arlington, Virginia 22217.

Air Force

The Air Force program will place approximately fifteen (15) students at each of the following educational institutions: Massachusetts Institute of Technology, Cambridge, Massachusetts; The University of New Mexico, Albuquerque, New Mexico; The Ohio State University, Columbus, Ohio; and Tuskegee Institute, Tuskegee, Alabama. Each student will be assigned as an apprentice to a staff member who is actively engaged in research and who will act as the student's mentor. The nominal assignment is for a ten week period of employment during the summer of 1980. The Federal minimum wage rate applies. The Air Force point of contact is Colonel Anthony J. Chiota, AFOSR/XO, Bolling AFB, D.C. 20332, telephone (202) 767-4929.

--END--

Department of Defense
Office of the Assistant Secretary of Defense
(Manpower, Reserve Affairs, and Politics)

Mr. Arch S. Ramsay
Associate Director, Staffing Services
Office of Personnel Management
1900 "E" Street, NW, Room 6F08
Washington, DC 20414

Dear Mr. Ramsay:

On April 22, 1980 your office approved our request to use the Stay-in-School and Summer Aid Schedule A appointment authorities for the employment of students Research Apprentices in a new program announced by the White House. These authorities will help substantially to implement the program. Your timely response to our request was appreciated.

At a recent program steering committee meeting, it became apparent that it may be desirable to employ students earlier than the present minimum employment age of 16. Participation during the first two years of high school is important to assure that students select the proper academic programs, particularly in mathematics. Most freshmen and sophomores are aged 14 or 15 years and would not be potential candidates unless the current minimum employment age were reduced. Yet students in the first two years of high school should be a prime target for this program because they have not yet made the decisions that this program is intended to influence. Many juniors and seniors who already have chosen the proper courses need little further encouragement and those who have not may need substantial remedial work and become discouraged.

While it is intended to direct much of the emphasis of this program to those aged 16 and over, the program's outcomes could be enhanced if directed to those age 14 and 15 as well. Title 5, United States Code, 3111 provides for the acceptance of volunteer services from students as part of a program designed to provide educational experiences. That authority will be used in appropriate cases. It is anticipated that other cases will emerge in which it may be proper to employ 14 and 15 year old students under the authorities cited above or under the High School Co-op authority (Schedule A, 213.3102(q)). OPM approval, therefore, is requested to employ students at those age levels, when considered appropriate, consistent of course with Federal, State, and local laws governing the employment of minors.

Sincerely,

CARL W. CLEWLOW
Deputy Assistant Secretary of Defense
(Civilian Personnel Policy)

Deputy Assistant Secretary of Defense
(Civilian Personnel Policy)

MEMORANDUM FOR Director of Civilian Personnel, Army
Assistant Deputy Chief of Naval Operations
(Civilian Personnel/EEO)
Director of Civilian Personnel, Air Force

SUBJECT: Minimum Age Pol. for the Research Apprenticeship Program

By the attached letter, the Director, Office of Personnel Management, approved a request to make exceptions to the minimum age requirement for employment in the DoD Research Apprenticeship Program. This authority is delegated to you and may be redelegated to Civilian Personnel Officers of your Components. Please note that the authority may not be used to employ students in the High School Co-op Program described in Basic FPM Chapter 308.

As noted in the OPM letter, it is expected that the major emphasis will be directed to students who are 16 years of age or older, and that the employment of younger students would be the exception rather than the general rule. Also, the provisions of 5 U.S.C. 3111, which allows for the acceptance of volunteer services from students as part of a program of educational experience, should be used as appropriate.

William C. Valdes
Acting Deputy Assistant Secretary of Defense
(Civilian Personnel Policy)

Attachment

UNITED STATES OF AMERICA
OFFICE OF PERSONNEL MANAGEMENT

Mr. Carl W. Clewlow
Deputy Assistant Secretary
(Civilian Personnel Policy)
Department of Defense
Washington, D.C. 20301

Dear Mr. Clewlow:

This responds to your letter of May 29, 1980, requesting exceptions to the minimum age requirement to support the Department's Research Apprenticeship and High School Cooperative Education Programs. The Director, Office of Personnel Management has approved your request to authorize the Department to employ high school freshmen and sophomores, aged 14 and 15, under the Research Apprenticeship Program only, as an exception to the minimum age requirement.

In approving your request for the Research Apprenticeship Program, we considered one of the basic program goals of reaching students early enough in their academic program to assure that they complete the proper courses which are prerequisites for admission into college curricula in the fields of science and engineering fields are traditionally in short supply and that apprentices who successfully complete such curricula would have better than average opportunities for employment, thereby increasing the Department's ability to support a program for expanding opportunities in the fields of sciences and engineering as enunciated in the White House release of October 30, 1979.

While we have approved this exception of the minimum age as indicated in your letter, the major emphasis should be directed to students 16 years of age and older. Hence, the employment of younger students would be the exception and not the general rule.

The Director has disapproved the Department's request to lower the minimum age for students participating in High School Cooperative Education Programs. Such programs generally are limited to students who plan to terminate their basic education upon graduation from high school. The preponderant number of these students are enrolled in commercial business curricula leading to careers as typists, stenographers and in other office skills. These programs, unlike the Research Apprentice Program, do not require the employment of freshmen and sophomores, aged 14 and 15, as a basis for stimulating interest in the office assistant and craft skills. Additionally, there is no need for guidance to assure that specialized curricula be followed as a basis for admission to institutions of higher learning.

Additionally, the number of students employed under cooperative education programs would usually not permit a one to one supervisor/employee relationship as would be the case under the Apprenticeship Program. Therefore, with

the lack of this close supervision, more problems would arise related to workmen's compensation for injuries sustained in the performance of duties, claims arising under the Tort Claims Act, and the numerous concerns regarding hazardous occupations and other restrictions imposed by the Fair Labor Standards Act, and State laws related to the employment of minors.

In light of the Director's decision, you are authorized, as an exception to the minimum age requirement, to employ high school students aged 14 and 15 and older under the Research Apprenticeship Program. All other instructions related to student employment published in the Federal Personnel Manual, State laws related to the employment of minors and the Department of Labor's regulations regarding assignments for youths under 18 years of age in hazardous occupations, are to be followed. If you have need for further clarification, please advise.

By direction of the Director:

Sincerely yours,

Arch S. Ramsay
Associate Director
Staffing Services

Department of Defense
Office of the Deputy Under Secretary of Defense for
Research and Engineering
(Research and Advanced Technology)

12 September 1980

MEMORANDUM FOR SERVICE FOCAL POINTS
DOD SCIENCE AND ENGINEERING APPRENTICESHIP PROGRAM

SUBJECT: Program Review

Addressees are requested to provide the following information relative to implementation of the Science and Engineering Apprenticeship Program in each Service.

For apprenticeships sponsored both through Service contract research activities and in-house laboratories:

- a. Target Number, Apprenticeships awarded (date).
- b. Principal Investigator volunteers (mentors) No.
- c. Method of Recruitment
 1. Students
 2. Mentors
- d. Pre-program activity
 1. Prospective students: briefing, interviews, screening, determination of interests, etc.
 2. Prospective mentors: Development of goals for the apprentices, expectations, organizational matters, etc.
 3. Nature of intellectual support for apprentices: e.g., tutoring, special classes, achievement, etc.
- e. Evaluation criteria and measures
 1. Apprentice
 2. Mentors
- f. Plans to track apprentice in his or her future academic career.

Since the overall objective of the Federal Science and Engineering apprenticeship program is to encourage the pursuit of careers in science and engineering by individuals from segments of our population that are underrepresented in these professions in general and in defense-oriented science and engineering in particular, it seems necessary to provide guidance and encouragement in curriculum planning. Comments on how the professional relationship between the mentors, their organizations, and the apprentices are sought.

Please indicate the extent to which recruitment of apprentice is achieved through:

- a. Direct professional contact between mentor and high school teacher or principal
- b. Use of institutional recruiting procedures (contractors, etc.)
- c. Use of volunteer organizations such as church groups, fraternal groups, etc.

What are the most effective ways to get our message to the target population?

A meeting to discuss results of Summer 1980 will be held in Ms. Carpenter's office, Room 3E318, 1000 hours, 19 September 1980.

Albert M. Bottoms
Assistant for DoD
Laboratory Management

DISTRIBUTION: Colonel Chiota (AFOSR) Colonel Dickinson (AFSC) Mr. Cooper (NAVMAT) Dr. Salkowitz (ONR) Ms. Jan Hart (NRL) Mr. J. Spates (DCSRDA) Mr. C. Weatherholt (OASD(MRA&L)) Dr. T. Jacobs ((ASN (RES)) Dr. W. Beam (ASAF(RDL))

Deputy Assistant Secretary of Defense
(Civilian Personnel Policy)

September 17, 1980

MEMORANDUM FOR Director of Civilian Personnel, Army
Assistant Deputy Chief of Naval Operations
(Civilian Personnel/EEO)
Director of Civilian Personnel, Air Force

SUBJECT: Minimum Age Policy for the Research Apprenticeship Program

Our memorandum of August 4, 1980, delegated authority to make exceptions to the minimum age requirement for employment in the DoD Research Apprenticeship Program.

The original OPM delegation excluded specifically the use of this delegation for appointments in the High School Co-op Program. It was not clear that DoD would be able to use it for appointments to the Research Apprenticeship Program when using the "High School Co-op" appointment authority, Schedule A, 213.3102(q).

In response to our request, OPM has clarified that the delegation may be used with any appointment authority in the excepted service that is appropriate for the employment of high school students. A copy of the OPM letter is attached. Please note the OPM emphasis that the authorization applies only to the Research Apprenticeship Program.

WILLIAM C. VALDES
Deputy Assistant Secretary of Defense
(Civilian Personnel Policy)

UNITED STATES OF AMERICA
OFFICE OF PERSONNEL MANAGEMENT

August 15, 1980

Mr. William C. Valdes
Staff Director
Office of Civilian Personnel Policy
Department of Defense
Washington, D.C. 20301

Dear Mr. Valdes:

This responds to your letter of 4 August 1980, requesting further clarification of the Director, Office of Personnel Management's approval of an exception to the minimum age requirement to support the Department's Research Apprenticeship Program.

Our letter of July 14, 1980, authorized the Department to employ high school freshmen and sophomores, aged 14 and 15. This was to permit these students to be considered early enough in their academic program to assure that they complete the proper courses which are prerequisites for admission into college curricula in the fields of science and engineering. This authorization applies to the Research Apprenticeship Program only and to appointing authorities in the excepted service appropriate for the employment of high school students.

Sincerely yours,

Arch S. Ramsay
Associate Director
Staffing Services

APPENDIX B

Highlights of the U.S. Air Force

Science and Engineering Apprenticeship Program

This Appendix contains a Summary of the Air Force program and samples of the Apprentice Project sheets that are maintained on each apprentice. The Air Force Office of Scientific Research (AFOSR) contracted the execution and evaluation of the program to the Accreditation Board for Engineering and Technology, Incorporated, and the University of Maryland respectively.

Air Force Science and Engineering

Apprenticeship Program

1. The target number of apprenticeship is 60. As of 1 May, 60 invitations were sent out to applicants. The contractor has a waiting list of qualified students and is confident that all 60 places will be filled.

2. Sixty principal investigators have been selected from volunteers from Ohio State University, University of New Mexico, Tuskegee and Air Force Weapons Laboratory (AFWL).

3. Student Recruitment. Advertisements were sent by the contractor to about 500 high schools in the vicinity of the three above mentioned universities. Within the 500 schools, principals, guidance teachers and science faculty were contacted and asked to recommend students for the program.

Mentor Recruitment. Program directors at each of the three universities approached science and engineering faculty and asked for volunteers. The response was more than adequate; AFWL solicited participation.

4. Preprogram Activity for Students. Orientation briefings will be given by program directors at each of the three universities. Screening and determination of interests was based primarily on written application information and letters of recommendation.

Pre-program Activity for Mentors. Each prospective mentor submitted a vita, a description of on-going laboratory activity and a description of goals and expectations for students to program director at each university. Selection of mentors was based on this information.

Nature of Intellectual Support. Plans are not yet formalized at all universities. However, Ohio State has planned to offer student a computer course including hands on experience. Math courses will probably be given as needed.

5. Evaluation criteria and measures are being developed under a separate AFOSR contract with the University of Maryland. Measures will consist initially of questionnaires and interviews. Criteria as determined by AFOSR includes: (a) information gained about the Air Force and about fields of science and engineering, (b) attitude changes concerning both areas, and (c) interaction and personal response of students and mentors.

6. University of Maryland plans to conduct follow-up of students for at least two years. Since students are high school juniors, we will know if they entered science and engineering programs in college and what role that mentor played in such decisions.

7. Recruitment is administered by a contractor which has been involved in such programs for seven years and is presently administering 43 other similiar programs.

RADHS

1980

**Program Funded by the
United States Air Force**

Participating Schools

**University of New Mexico
Ohio State University
Tuskegee Institute**

Second Report

**Roy B. Cowin
August 1980**

Research Apprenticeships for Disadvantaged High Schoolers (RADHS) is an Air Force Office of Scientific Research (AFOSR) funded project conducted at the University of New Mexico, Ohio State University, and Tuskegee Institute under the administration and direction of the Engineers' Council for Professional Development (ECPD). This program can best be described as a ten-week work experience in a research area for sixty disadvantaged rising high school seniors serving as apprentices in a one-on-one role with a researcher mentor.

In a previous report dated May 1980 ECPD demonstrated the availability of sixty mentors for the summer of 1980, and there was no shortage of qualified students.

The indecision of the three college of engineering in determining the number of mentors each could obtain coupled with ECPD's desire of securing the full complement of mentors and students resulted in actually obtaining sixty-one each. It should also be noted that some of the probable mentors cited in our earlier report did not serve and others did.

The final participation in the actual program may be summarized as follows:

<u>School</u>	<u>Mentors</u>		<u>Students</u>	<u>Total Weeks</u>	
	<u>Univ.</u>	<u>AF</u>		<u>Allotted</u>	<u>Est.</u>
UNM	14	5	19	190	190 OSU
TI	25	0	25	240	220
TOTAL	39	5	61	600	580

A brief synopsis of the research to be undertaken by each of the apprentices may be found in the appendix. Mentors are listed for each student, and such information pertaining to the qualifications of the mentors not yet furnished will be forwarded with the final report.

The projects undertaken were numerous and varied. These may be summarized as follows:

<u>School</u>	<u>Depts. Involved</u>	<u>Some of the Topics Studied</u>
UNM	8	Many health related, much library research involved. One project involved the complete installation of a new laboratory and calibration of its instrumentation.
OSU	8	Energy conversion and resources, safety, health, and flood control were studied. One project involved preparation of a nuclear plant operator's manual.
TI	4	Energy conservation and alternate sources, safety, material life, and safety were studied. One project involved the study of the spinal column under axial compression.

APPENDIX

1980 RADHS

AT University of New MexicoMentor: Dr. Edward ReyesApprentice: Deborah BDepartment: Pharmaulogy
(Attach brief vita, if not
previously furnished.)Address: 12624 Tomlinson SE
Albuquerque, NM 87123Phone: 292-2036Project: Biomedical Research Lab

Brief Description: The apprentice will learn first-hand the use of the library to support basic research, through the use of various library search procedures used in acquiring basic information relating to a specific problem. The apprentice will be given a problem to research in the library and required to write up a short research proposal. Actual lab research will then be conducted by the apprentice to answer the questions addressed in the proposal.

Date started as RADHS project

16 June 1980Estimate completion date as a
RADHS project22 August 1980

1980 RADHS

AT University of New MexicoMentor: Ermanuel Akporiaye, graduate studentApprentice: Pamela VDepartment: Biology
(Attach brief vita, if not previously
furnished.)Address: P.O. Box 371
Bernalillo, NM 87004Phone: 867-3684Project: Host - parasite relationships

Brief description: Using macrophage-like tumor cells and Q fever-causing Rickettsia to study the ability of Coxiella burnetii to cause a persistent infection in some of the Macrophage-like tumor cells.

This summer the lab will examine the role of lysosomes in the degradation of bacterial pathogens in these Macrophages employing the electron microscope. The ability to employ the electron microscope in gainful scientific pursuit will be of major benefit to the student.

The student will learn to process tissue for electron microscopy as well as darkroom procedures to develop and print pictures taken with the electron microscope.

Date started as RADHS project

16 June 1980Estimate completion date as a
RADHS project22 August 1980

1980 RADHS

AT University of New MexicoMentor: Leonard JusinskiApprentice: Walter GDepartment: AFWL Laser Research
(Attach brief vita, if not previously
furnished.)Address: 301 Ranchitos Rd. NW
Albuquerque, NM 87114Phone: 898-2951Project: Laser Research

Brief description: The apprentice will learn first hand the daily routine operation of a research lab; an overview of the lab environment; The trainee will assist in optical alignment, calibration, and the actual operation of a state-of-the-art experiment.

This will greatly enhance the student's ability to function in a research environment.

Dated started as RADHS project

16 June 1980Estimate completion date as a
RADHS project22 August 1980

1980 RADHS

AT University of New MexicoMentor: Farojallah Ghambari, grad studentApprentice: Joey NDepartment: Chem Nuclear Engineering
(Attach brief vita, if not previously
furnished.)Address: 1100 Silver SE.
Albuquerque, NM 87106Phone: 247-1178Project: Measurement of the Thermal Neutron Absorption Cross-Section
of Sulfur

Brief description: A library search will bring information up to date. This will include computer use. The next step is to design the proper electronic circuits and to assemble the different components which will include the use of high voltage supplies, preamps, amplifiers, single and multiple channel analyzers, nuclear detector; There will be a sample activation of the neutron generator and the AGN-201 training reactor; the final step will be to carry out the experiment and collect the data.

Dated started as RADHS project

9 June 1980Estimate completion date as a
RADHS project15 August 1980

1980 RADHS

AT University of New MexicoMentor: Dr. Albert Eatner
David Yelvington, grad studentApprentice: Stephen G.Department: Physiology
(Attach brief vita, if not previously
furnished.)Address: 4709 General Douglas
MacArthur NM
Albuquerque, NM 87110Phone: 881-2044Project: Endocrine Lab

Brief description: To elucidate a possible relationship between stress induced hormonal changes and learning behaviour. The apprentice will have the opportunity to learn about various aspects of endocrine regulation and observe how change in hormone level can alter behaviour. The student will learn surgical techniques and the use of several lab instruments, and will be exposed to the use of computers in a research setting. The student will also learn how to use research facilities such as the Index Medicus and the Science Citation Index to locate pertinent information.

Dated started as RADHS project

9 June 1980Estimated completion date as a
RADHS project15 August 1980

APPENDIX C

The U.S. Army Science and Engineering Apprenticeship Program
for High School Student, Summer 1980

The Army program placed apprentices with mentors at Universities through the Army Research Office and directly at Army in-house laboratories. The Army Research Office used the Academy of Applied Science as a contractor to administer the program. An attempt was made to coordinate this program with the Army initiatives to stimulate research at Historically Black Colleges (HBC). The major Army research and development commands provided the necessary hiring authorities to their organic in-house laboratories.

This Appendix provides:

- o A Copy of the Army Action Plan for the Apprenticeship Program.
- o A Report of the ARO Summer Program
 - **Examples of monitoring reports
 - **A letter report from the Academy of Applied Science
 - **An Annex relating to the HBC Program
- o A Letter Report from the U.S. Army Corps of Engineers
- o An information paper outlining in-house Appointing Authorities

ARMY ACTION PLAN
FOR
RESEARCH AND ENGINEERING APPRENTICESHIPS

The vitality of the nation's defense is inherently dependent on adequate availability of personnel with a high degree of orientation to science and engineering. These men and women are needed in uniformed functions, in the Army in-house activities, and in the private sector elements assisting in technological functions. Events of the past several decades have resulted in a reduction in the size and relative quality of the US defense technology community. It is essential that actions be initiated to better ensure availability of people who are qualified to perform and are oriented to performing professional and support work in defense life and physical sciences. Accordingly, this plan presents proposed initial Army actions which are intended to increase the size and to improve the quality of the US defense technical community. The program is experimental in nature.

1.0 OBJECTIVE AND APPRENTICESHIP PARTICIPANTS

The objective is to provide a cooperative education (work/study) program which will afford hands-on experience in Army research, development, and acquisition activities to high school students who may choose to enter and complete basic education in science and engineering. The basic criterion for selection of participants will be the potential shown for pursuing careers in science and engineering. While it is recognized that any such selection criterion is necessarily subjective in nature, factors the Army would consider in the selection process would include: (1) previous demonstrated abilities and interests in science and engineering (for example: number of science courses taken and grades achieved, and participation in extracurricular technical activities such as science clubs and science fairs); and/or (2) potential for a successful career in the field as indicated by overall scholastic achievement; (3) recommendations of high school teachers and administrative personnel; and (4) interviews with prospective participants. In developing possible sources from which to select students for the program, the Army will make a deliberate effort to identify high school students from "socially and economically disadvantaged" groups as that term is defined in Public Law 95-507.

In enacting P.L. 95-507 the Congress found that: (1) the opportunity for full participation in our free enterprise system by socially and economically disadvantaged persons is essential if we are to obtain social and economic equality for such persons and improve the functioning of our national economy; (2) many such persons are socially disadvantaged because of their identification as members of certain groups that have suffered the effects of discriminatory practices or similar invidious circumstances over which they had/have no control; and (3) it is in national interest to expeditiously ameliorate the conditions of socially and economically disadvantaged groups.

Therefore, while the Army does not intend to limit participation in the program to such individuals, consistent with the Congressional findings, it will undertake action to identify for participation in the program qualified high school students who are socially and economically disadvantaged. Participation by such individuals will assist not only in effecting Congressional objectives for involving such individuals in government contracts, but also has the potential for ameliorating the underrepresentation of such individuals in the government work force consistent with the requirements of 5 U.S.C. 7201. Thus, the program may help the Army develop a resource of talent previously unavailable to it or DoD generally and which is necessary for the growth of defense technology community. Under P.L. 95-507 the following groups, and such others as the Small Business Administration may designate pursuant to the law, are presumed to be socially and economically disadvantaged: Black Americans, Hispanic American, and Native Americans. In addition, such groups as may be designated by the Office of Personnel Management in implementing 5 U.S.C. 7201 will be considered part of this program.

2.0 GENERAL APPROACH

High school students accepted for apprenticeships will be (1) paid during work periods, and (2) will work directly under a mentor scientist or engineer who will provide guidance on day-to-day job activities and be available to assist in providing information on career opportunities in science and engineering.

The Army will conduct the initial program among two communities: (1) its in-house laboratories and R&D test activities and (2) its not-for-profit R&D contractors who volunteer to participate. The scope of the program may be expanded to include industry at a later date (this decision will be dependent on experience with the program, need, and policy considerations).

3.0 RESPONSIBILITY LEVELS

It is intended that this program will be conducted among the four Army developer agencies:

- US Army Materiel Development and Readiness Command (DARCOM)
- US Army Medical Research and Development Command (MRDC)
- US Army Corps of Engineers (COE)
- US Army Institute of Social and Behavioral Sciences (ARI)

These agencies will determine the level of delegated responsibility on a case-by-case basis. In general, they will be encouraged to permit/achieve full self-determination of program actions at the local level (e.g., within a single laboratory). "Micromanagement" is to be strongly discouraged.

4.0 PROGRAM SIZE, GROWTH, AND DISTRIBUTION

The intent is to accommodate as many apprentices as practicable at as rapid a rate as can be handled in an orderly manner. As a general goal, it is hoped that the Army will accommodate a minimum of 70 apprentices in the program in 1980 and expand at least twofold in 1981. Opportunity locations are geographically widely distributed (i.e., over 25 different locations within

Note: A preliminary survey of in-house activities and selected not-for-profit contractors indicates the potential for significantly exceeding the foregoing goals as the program matures.

5.0 MANPOWER AUTHORIZATION

The Army will not provide in-house activities special manpower space authorizations unless necessary to ensure apprentice program effectiveness. Developer agencies' manpower policy and procedures are anticipated to be currently adequate.

6.0 PAY AND FUNDING

Entry apprentices are to be paid in accordance with Civil Service pay scales pertaining to cooperative education programs.

The budget impact for Fiscal Year 1980 is to be borne by the Department of the Army, through reprogramming if necessary. To the extent practicable, developer agencies will draw from their established budget.

Note: In return for the cooperation in FY80, the Office of Management and Budget anticipates providing special funds in FY81 sufficient to cover anticipated program size.

7.0 IMPLEMENTATION SCHEDULE

The program will be instituted as soon as practicable; target schedule for attainment:

Announce program in February/March 1980.

Local preplanning and identification of initial sponsors, mentors, and coordinators completed in March 1980.

Mentors and coordinators appointed by end of April 1980.

Tentative identification of apprentices by end of April 1980.

Funding guidance/authorization by end of April 1980.

Enrichment activities planned and priced by end of April 1980.

8.0 PROCUREMENT CONSIDERATIONS

Programs undertaken by not-for-profit sponsors are to be fully voluntary.

Every effort will be made to keep participation or potential participation wholly separate from grant or contract determinations. Consequently, consideration will be given to the use of mentors after the contractor or grantee has been determined (e.g.: for future awards, participation or nonparticipation by potential performers will not be a consideration in performer selection). Administrative burdens on contractors are to be kept to a low level.

9.0 STIMULATING INTEREST: IDENTIFYING/SELECTING SPONSORS AND MENTORS, AND APPRENTICES

As with responsibility levels (Section 3.0), these actions will in general be left to the local organization. Developer agencies may provide guidelines, tips, lessons learned, and related information in an advisory capacity if they deem such action to be helpful.

Sponsoring organizations will be expected to employ a wide array of stimulation approaches; e.g.: use available publicity films; sponsors laboratory tours and program presentation; on-site visits with mentors; science fair support. (It is recognized that many elements of the Army have been working diligently to provide affirmative action programs bearing on careers in science and engineering. See Section 20, TIE-INS.)

Participation by sponsors, whether in-house or under contract, will be wholly voluntary. The identification and selection of mentors is a major consideration. Where practicable, the mentor will be a person whose primary duties are "hands - on" bench work so that the apprentice interfaces continually with the mentor. The mentor's situation should be one in which there is a significant amount of time spent in "doing" research/engineering which the apprentice can observe, assist with where practicable, and be "taught" at the same time. Each mentor should be involved in the apprentice selection process at the outset and should make the final decision on whom they will accept. Rarely, should a mentor try to oversee more than one apprentice. The appropriateness of specific mentors is a critical element to program success and is to be left to the sponsoring local organization.

Development of criteria and screening of candidates should be accomplished jointly by the mentor and the school sponsor (if any) in the case of in-house apprenticeships. (In the case of a contractor, the same procedures would apply; however, there needs to be mechanism that ensures a government representative has periodic contact with the apprentice if practicable.) In any event, the mentor should personally interview the student. Schools should not be permitted to make unilateral decisions. Initial identification of the sources of potential apprentices may be done by the administrators of the program but should not be done in such that teachers or anyone else are permitted to limit the mentor's choice by presenting a selection list of two to three students. Ideally the mentor and teachers should make the choice in consultation.

Since programs at schools vary from one locale to another, criteria for selection will be generally prescribed by Army higher authorities and specifically tailored at the local level. A student will not be penalized simply because his/her school and program are different (e.g., less comprehensive) than that of another school. Tentative general priorities for apprentice selection by school year are: seniors, first; juniors, second; sophmores, third.

Criteria will need to be fairly rigid and controlled at the local level to ensure selection of students who have demonstrated potential, interest, and aptitude. Left to "local designs," the program has the potential for permitting financial status to outweigh basic qualifications and interests in science and engineering. (It has been our experience that people in similar

programs are often just looking for summer jobs; recommendations from teachers are often based largely on financial need of the student rather than his or her ability and desire to learn and possibly pursue a career in science or engineering). The program must ensure apprentices who are reasonably intelligent and highly motivated to make the apprenticeship a solid work/study experience.

If potential sponsors/mentors cannot locate appropriate apprentices in their locale, the developer agency will assist in identifying candidates if practicable.

10.0 LENGTH OF APPRENTICESHIP

Once the student is brought into the program, his/her progress and association with the organization will be encouraged on a continuing basis (hopefully until as a college student he/she becomes eligible for other programs such as co-op or internship).

Apprentices who can do so and who can be accommodated by their sponsor/mentor will be "employed" on a part-time basis throughout the post-summer period.

11.0 UTILIZATION

Control of utilization and effective use of time, particularly in contractor settings, pose a problem (because the "low level of competency" among apprentices can easily result in their being assigned tasks irrelevant to the intent of the program). Mentors are the key to effective utilization. Implicit guidelines should be provided to all sponsors/mentors to minimize malutilization practices. Consideration will also be given to assessing this aspect as part of overall program evaluation.

12.0 ADMINISTERING ENTRY INQUIRIES

No overall process of admission applications is to be instituted. Instead local agencies will determine procedures suited to the local environment and to their administrative capacity. Applications from students directly is not considered productive. Screening by the high schools or other is essential if the program is to be administered in an orderly and effective manner. Referral of potential apprentices to organizations likely to be responsive should be provided for in general administrative procedures.

13.0 LIVING ACCOMMODATIONS

Provision of living accommodations are considered generally infeasible. Apprentices should live within daily commuting distance of their jobs. Sponsors are free to provide special transportation with legal limits if they elect to do so.

14.0 SECURITY

No exceptions to standing security procedures will be authorized. Where security is a critical issue, apprentices shall be given in-depth orientation to procedures to minimize potential violations.

15.0 RESTRICTIONS

In general, this program is deemed applicable only to high school students in their junior or senior years although provision exists for extending the program to sophmores (14 year old). Local and state child labor laws (etc.) must be fully observed. Safety regulations precluding the presence of underage personnel are to be similarly observed. Issues such as benefits, liability, medical coverage and physical examinations are to be resolved on a local basis, in accordance with applicable laws and regulations.

16.0 WORK SETTING

Care must be taken in choosing the environment in which the apprentice will work; it should serve his or her aspirations. Apprentices should only be put in research situations where their limited skills do not prevent them from exerting tangible efforts and recognizing themselves as participating members of teams directed toward some recognizable goals. They must realize a sense of contribution to the work at hand, understand, their contribution, and in general understand what was accomplished.

17.0 ADMINISTRATIVE ASSISTANCE

To the extent permissible by law, sponsors may use contractual assistance to help administer this program. However, personal service conflicts are to be avoided.

18.0 REPORTING AND EVALUATION

Mentors/sponsors will be required to report periodically on the status of apprentices. A trend analysis over a period of time showing intent and actual major in college will be developed to gauge program needs, directions, and emphasis in future years.

This reporting will be incorporated in an evaluation product. The approach to evaluation will be developed as experience with the program is obtained. Insofar as practicable, the evaluation will include relevant information from other Military Department apprentice programs and from those of the participating federal civil agencies.

19.0 FOLLOW-ON/RETENTION

A useful facet will be a follow-on mechanism to keep track of the apprentices throughout their college experience to see if they actually major in science or engineering. If they do, the follow-on would be useful in maintaining contact with a view toward future employment. Civilian Personnel Office, CPO's will be required to take an active interest in assisting the apprentice and his mentor so that the administrative side of the issue does not later get represented as an impersonal and negative force.

20.0 TIE-INS

Participants will be encouraged to recognize potential tie-ins with affirmative action programs, high school ROTC, and other related programs.

Consideration will be given to superimposing this program on an existing student aid or internship program in order to simplify administration, accountability, and management. (Proliferation of independent programs, each with its own special rules and quirks is administratively counterproductive and confusing.)

21.0 SHAKEDOWN PERIOD

Because this program is highly experimental, a trial period is essential to establish effective procedures and policies. Publicity should be tempered accordingly.

22.0 POLICY CONSIDERATIONS/CAVEATS/INITIATIVES

All actions must be conducted within established authorities. Civil Service qualification requirements apply for apprentices who become in-house employees.

23.0 OPERATING PLANS

The developer agencies (cited in Section 3.0) will prepare individual operating plans in general accord with this overall plan.

24.0 POINTS-OF-CONTACT

Initial overview of this program will be provided by the OASA/(RDA)/ Dr. E.E. Yore and ODCSRDA/Mr. J.E. Spates (DAMA-ARZ-C/(202) 697-3460). The operating plans cited in Section 23.0 will provide for each developer agency that agency's point-of-contact charged with initial overview responsibility.

ARMY RESEARCH OFFICE
RESEARCH & ENGINEERING
APPRENTICESHIP SUMMER PROGRAM

BACKGROUND

- o DR. FRANK PRESS' (OSTP DIRECTOR) INITIATIVE TO STIMULATE A MINORITY SCIENTIFIC APPRENTICESHIP PROGRAM IN THE FEDERAL GOVERNMENT
- o 30 OCTOBER 1979, MEETING OF DOD, DARPA, ARMY, NAVY, AND AIR FORCE REPRESENTATIVES TO DISCUSS DOD IMPLEMENTATION OF THE OSTP REQUEST FOR SCIENCE APPRENTICESHIPS
- o IMPLEMENTATION THROUGH THE GRANT/CONTRACT RESEARCH PROGRAMS
- o INCENTIVE OF \$2,500 PER APPRENTICE
- o PROGRAM LIMITED TO HIGH SCHOOL STUDENTS
- o TARGET POPULATIN - SOCIALLY AND ECONOMICALLY DISADVANTAGED
- o DOD PARTICIPATION QUOTA IN FY 80 - 200+; FY 81 - 400
- o FY 80 FUNDS - INTERNAL REPROGRAMMING
- o FY 81 FUNDS - OMB?

AUTHORITY

TASKING LETTER, DRCLDC, HQ, DARCOM, 29 MARCH 1980,
SUBJECT: ARMY RESEARCH AND ENGINEERING APPRENTICESHIPS
FOR HIGH SCHOOL STUDENTS

RESEARCH & ENGINEERING APPRENTICESHIP PROGRAM

OBJECTIVE

PROVIDE A COOPERATIVE EDUCATION (WORK/STUDY) PROGRAM OF MENTOR/APPRENTICE WHICH WILL AFFORD HANDS-ON EXPERIENCE IN DEFENSE RELATED ACTIVITIES TO HIGH SCHOOL STUDENTS WHO MAY CHOOSE TO ENTER AND COMPLETE BASIC EDUCATION IN SCIENCE AND ENGINEERING

RESULTS OF SURVEY TO IDENTIFY
ARO INTERESTED PI'S (MENTORS)
IN PROGRAM

- o 324 LETTERS TO PI'S FOR EXPRESSION OF INTEREST IN FY 80 AND FY 81 PROGRAM
- o 120 (37%) RESPONSES WERE RECEIVED
- o 22 PI'S - NO INTEREST IN PROGRAM
- o 78 PI'S - INTEREST IN FY 80 PROGRAM
- o PI'S - INTEREST IN FY 81 PROGRAM

PROCEDURE FOR EXECUTION OF PROGRAM

- o A PRIME GRANTEE (NON-PROFIT ORGANIZATION) ADMINISTERED THE FY 80 SUMMER PROGRAM
- o THE PRIME GRANTEE WAS RESPONSIBLE FOR NEGOTIATING SUBGRANTS WITH SPONSORING INSTITUTIONS
- o SELECTION OF MENTORS WAS THE PRIME GRANTEE RESPONSIBILITY FROM THE LIST IDENTIFIED THROUGH SURVEY
- o THE SUBGRANT OF \$2,500 WAS USED TO PAY THE STUDENT AND TO DEFRAY COSTS INCURRED BY THE INSTITUTION
- o THE PRIME GRANTEE WILL PROVIDE A REPORT IN DECEMBER 1980

STATUS OF APPRENTICESHIP PROGRAM

FY 80

- o THE ACADEMY OF APPLIED SCIENCE, INC., WAS AWARDED A GRANT
FOR \$170, 200 TO ADMINISTER FY 80 SUMMER PROGRAM
- o FIFTY-FIVE APPRENTICES WERE HIRED

PARTICIPATING UNIVERSITIES

University of Alabama	North Carolina State University
University of Arizona	University of Pennsylvania
Arizona State University	Polytechnic Institute of New York
Boston University	Portland State University
University of California at Davis	Princeton University
Carnegie-Mellon University	Rensselaer Polytechnic Institute
Case Western Reserve University	Rutgers University
University of Cincinnati	University of South Florida
Colorado State University	University of Southern California
Columbia University	Stanford University
University of Delaware	State University of New York at Stony Brook
Drexel University	Temple University
Georgia State University	University of Texas at Arlington
George Washington University	University of Texas at Austin
University of Illinois	University of Utah
Illinois Institute of Technology	University of Virginia
University of Iowa	Virginia Polytechnic Institute and State University
Johns Hopkins University	Wayne State University
University of Kansas	Yale University
University of Maryland	University of New Hampshire
Massachusetts Institute of Technology	University of New Orleans
Michigan Technological University	
Mississippi State University	
Montana State University	

SUMMARY OF APPRENTICES' BIOGRAPHICAL DATA

TOTAL NUMBER: 55

SEX: MALES - 29

FEMALES - 26

YEARS IN SCHOOL:

JUNIORS - 16

SENIORS - 33

AGES:

YEAR OF AGE

NUMBER

19

1

18

9

17

19

16

19

15

1

ETHNIC BACKGROUND:

BLACK 22

ORIENTAL 5

HISPANIC 13

WHITE 15

CAREER CHOICES WHEN PROGRAM STARTED

COMPUTER SCIENCE

6

ELECTRONICS

1

ENGINEERING

13

ARCHITECTURE

1

MEDICINE

6

SCIENCE

2

CHEMISTRY

3

UNDECIDED

8

MICROBIOLOGY

1

BETWEEN 2 FIELDS

PHYSICS

1

UNDECIDED

7

STATUS OF APPRENTICESHIP PROGRAMFY 81

- o THE ACADEMY OF APPLIED SCIENCE, INC., WILL BE AWARDED A GRANT FOR \$250,000 TO ADMINISTER THE FY 81 SUMMER PROGRAM
- o APPROXIMATELY 90 APPRENTICES ARE EXPECTED TO BE HIRED

THE ACADEMY OF APPLIED SCIENCE

2 White Street
Concord, N.H. 03301

September 26, 1980

Dr. Josephy M. Majowicz
Department of the Army
U. S. Army Research Office
P.O. Box 12211
Research Triangle Park, NC 27709

Dear Dr. Majowicz:

Enclosed is the short report we discussed on the telephone and copies of excerpts from letters which are typical of the suggestions received. Other ideas are from notes I took from telephone conversations.

As I reviewed the correspondence that we have received from the beginning of the project, I came upon a suggestion made last May by Marion T. Loftin, Vice President for Graduate Studies at Mississippi State University. He suggests awarding sub-contracts on a firm-fixed price, level of effort, basis. I am enclosing that part of his letter.

I do not quite understand what this would mean and since it was the only recommendation of this nature I did not include it in the report. However, I feel that all suggestions should be considered so I am sending it along for your judgement.

As the reports continue to come in I shall keep you informed especially of anything new. We are beginning to tabulate what data we have. Let me know if you need any other information.

Sincerely yours,

Ruth R. Curtis

Enclosure: 7

Copy to: Hodges Throckmorton

To: Joseph M. Majowicz

From: Ruth R. Curtis

Subject: Some Reactions from Research Professors (Mentors)
Concerning REAP for the Summer of 1980

The general response thus far to the program has been one of enthusiastic approval. All of the mentors who have reported have indicated a desire to participate next summer even the three that had to abandon the project. However there have been several recommendations for change in future administration of the various activities that merit consideration. Not all reports are in but the suggestions indicate a trend.

More lead time has been suggested by everyone. There is no doubt that in some cases we lost top flight talent as many of these youngsters were already committed.

Two of the grants had to be abandoned because suitable candidates could not be found in time. After school closes, as early as June first in some places, it is very difficult to contact students of the groups we are trying to reach.

April first seems to be the date a researcher should start looking for an apprentice. This means the contracting office should begin in January or February. March first the very latest. This later date would involve extensive use of the telephone again.

More flexibility in the use of funds is next on the mentor's list of suggestions. In quite a few areas the pay scale of a GS1-\$7200/year is too high. At Colorado State a graduate research assistant receives \$400-\$500 per month and an undergraduate student somewhat less. The same is true at Columbia. At the University of Illinois the rate is \$3.10/hour, the minimum wage. (In January 1981 this will have to increase to \$3.25). The GS1 figures at \$3.47/hour.

Since, of necessity, the apprentice must work in some relationship with graduate students, even though most closely with the mentor, and since the apprentice's knowledge and experience are in no way comparable to that of the graduate students, the apprentice's higher stipend was often an embarrassment.

The mentor would like to be able:

1. To pay the apprentice a wage commensurate with that of graduate students and college students.
2. and/or perhaps use some of his half of the grant as a bonus to his assistants for helping him with REAP.

Expansion suggestions are also beginning to come in. Some institutions can use more than the number of grants they had this past summer. (Not enough reports are in yet to get a count.) Two professors have suggested continuing the program through the winter as an after-school job in order to keep the apprentice's motivation high.

In selecting apprentices it has been suggested that seniors and rising seniors be the categories to choose from. Rising Juniors have only completed the Sophomore year and do not have the background. Rising Seniors are better and Seniors are better still.

Could using Seniors and a winter program for Juniors be two way of keeping track of what these young people do with their futures? Several of the apprentices in their reports have expressed an interest in continuing in the program in some way.

When all the reports are in there will be more conclusive data and probably more suggestions. Hopefully a rough draft will be ready November first.

Ruth R. Curtis
September 26, 1980

MISSISSIPPI STATE UNIVERSITY

May 26, 1980

page 2

The amount of funds allocated for supplies will be solely for the apprentice. Several of the needed items are quite expensive. Isotopes can cost as much as \$100 for a single experiment. The chemicals and specialized glassware for electrophoresis, which will be a major part of the project probably will cost \$200-300. Other miscellaneous supplies such as seeds, books and disposable laboratory ware will require the remainder of the supply budget.

We would like to take this opportunity to endorse this program. Here in Mississippi we have many well qualified high school students from socially and economically disadvantaged groups. We believe that the apprenticeship experience under this sub-grant could result in the student pursuing a career in science that might otherwise not be considered possible.

Per your discussion with Mr. Price, we would suggest that the administrative requirements of this pilot program (indirect cost are absorbed by the institution) be reduced in future years by awarding sub-contracts on a firm-fixed price, level of effort, basis (level of effort relating to the student/apprentice).

If the above three points of clarification, including the proposed budget, are acceptable to you, please indicate by signing and returning the enclosed copy of this letter. Again, thanks for considering Mississippi State University for this pilot program. Should questions arise, please feel free to contact Mr. Price at (601) 325-4325.

Sincerely,

Marion T. Loftin
Vice President for Graduate
Studies and Research

APPROVED:

MTL/bds

cc: Dr. _____

Ms. Ruth R. Curtis
The Academy of Applied Science
2 White Street
Concord, NH 03301

Dear Ms. Curtis:

In response to your letter of July 2 and July 15, 1980, I enclose the requested biographical data. Andy L started work on June 2, 1980. Following your guidelines (GS-1, \$7,200 FY80), he has been paid \$600.000 per month for two and one-twelfths months, for a total of \$1,250.00. The remaining \$1,250.00 has been used to purchase materials, supplies, and equipment used in conjunction with Andy's project.

Because he has worked out so well and has really been an asset to my group this summer, he will continue to work during August, supported on my regular research grant monies.

I should note that the specified pay scale is completely out of line with that for regular student help. A graduate research assistant receives about \$400-500 per month, and an undergraduate assistant somewhat less. To pay a high school student at a rate well above these levels is probably unwarranted.

Sincerely,

Carl E. Patton
Professor

CEP: tm

Enclosures

RESEARCH AND ENGINEERING APPRENTICESHIP PROGRAM

DIRECTOR'S REPORT

From _____ to _____, 1980

Sponsor Institution COLUMBIA UNIVERSITY

Mentor WILLIAM HAPPER

Apprentice TYRONE G

Project: (Please describe briefly, including subject and objective of the research project, the type and level of work done by the apprentice and an evaluation of the student's performance.)

Mr. G. worked on a small computer with graduate students in the Physics Department of Columbia University. He had never used a computer before so most of his summer was used in learning to program the computer. I found him rather immature. He seemed to feel that his employment was a right to which he was entitled and that no responsibilities were required from him. For example, when he finally learned to program the computer, he spent most of his time programming the computer to play games and he was reluctant to help us attack real problems of research. I also think that the salary was too high. Mr. G. earned more than we pay our graduate students.

On the whole, I think the experience was successful. However, should I do it again, I would select with more emphasis on maturity, responsibility and achievement, and less on evidence of deprivation but great potential. This would probably mean that I would be hiring upper class minority students with little to distinguish them from any other students from the social majority. I would also insist on flexibility to pay the student at a rate commensurate with salaries paid more senior students of the college level and of the graduate school level.

Comments and suggestions from North Carolina State University, Raleigh, N.C.:

I have offered Mr. P. free use of our computer during the academic year if, he wishes to keep a "hand-on" practice. But I think that his motivation would have been increased several folds if there was even a (much reduced) financial incentive. I believe that an additional \$200 per month would have kept the fires burning until he graduates from high school next June.

The first two months are very much packed with a lot of activities, because he had to learn a lot, not only technically, but also socially and institutionally. A continuation thereafter, even at a much reduced level, would have benefitted both of us. (Having finished teaching him the essential principles, now I can really use him to help in my research program. On the other hand, now that he knows what it is about, he can really savor the deeper meaning of what he has been taught.)

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS

15 September 1980

MEMORANDUM FOR MR. SPATES, DAMA-ARZ-C

SUBJECT: Corps of Engineers (CE) Implementation of Research and Engineering Apprenticeships for High School Students Program

1. Following is information requested on current status of subject keyed to information required by Memo DDRE, 29 April 1980, Subject "Program Evaluation Criteria".

- a. The initial CE target number was 10. To date 7 have been employed.
 - b. There is one mentor for each student. In addition laboratories not yet employing students have identified a minimum of 2 mentors each.
 - c. Recruitment of students has been accomplished in conjunction with local school officials. Each have been visited and briefed on the program and the types of disciplines and opportunities involved. School officials were then requested to screen and recommend students that would qualify. Students were then screened by laboratory management and mentors and final selection made. Mentors are volunteer laboratory researchers.
 - d. All students have been given individual orientations to the program and job assignments. The degree of supervision, training, etc. is under constant refinement as both the laboratory and students become more familiar with the program.
 - e. Selection of students have been based on demonstrated skills, interest and need. The overriding consideration has been to identify and encourage students with scientific or engineering aptitude who might not pursue such a career without this program.
 - f. In all cases Individual Development Plans are, or will be prepared for each apprentice to provide for long term career development.
 - g. Apprentices and mentors functions on a one-to-one basis.
2. The program has been enthusiastically received by CE laboratories and schools/students contacted. We anticipate it will be successful in accomplishing its objectives. The program has been implemented in two CE laboratories. In the other laboratories mentors have been identified but student selection deferred until the 1980-81 school year.

3. A more detailed review is underway with report to follow.

FOR THE CHIEF OF ENGINEERS:

A.E. SIMONINI
Chief, Laboratory Operations
Research and Development Office

3. A more detailed review is underway with report to follow.

FOR THE CHIEF OF ENGINEERS:

A.E. SIMONINI
Chief, Laboratory Operations
Research and Development Office

INFORMATION PAPER

DAPE-CPS
7 Feb 80

SUBJECT: Appointing Authorities Appropriate for Research and Engineering Apprenticeships (In-House)

1. Cooperative Education Program for Students in High Schools

Schedule A, 213.3102(q) (FPM Chapters 308 and 213). Appointments under this authority must not exceed 1040 hours per year on a schedule planned in advance under a cooperative education agreement between the school and the Army appointing authority. Work assignments must be related to the student's field of study. Work periods will be determined by the agency in cooperation with the school; however, in no case must all periods be scheduled during summer or school vacations. Students are appointed to positions at the GS-1 level or wage grade equivalent and must meet education and experience standards (but no test requirements). Application procedures for employment under this authority must meet the requirements of FPM Chapter 302, Employment in the Excepted Service (e.g., Veterans Preference, equal employment opportunity, method of rating and ranking of applications). Selection is to be based on agency need and the student's apparent capacity to meet that need. Although appointment of cooperative education students is subject to normal ceiling controls, CPR 400, 410.E-5b permits some flexibility in enrolling students in pairs and alternating work and school schedules of the program so that only one personnel space is needed to support two students. Since personnel ceilings apply to the last day of the fiscal year, there is considerable flexibility in applying them within the year, particularly with respect to non-full-time employment.

2. President's Youth Opportunity Stay-In-School Campaign

Schedule A, 213.3102(w) FPM Chapter 213. Appointments of high school students under this authority are based upon a determination that a student needs the earnings to stay in school. Appointments are limited to one year or less but may be extended for additional one year periods if the conditions for initial appointment are still met. Employment is restricted to sixteen hours per week except that students may work full time when their school is officially closed. Recruitment sources are State Employment Service offices, school counselors, private and public welfare agencies and State and other rehabilitation agencies. Appointees are generally paid at the minimum wage, but may be employed in a general schedule or wage system rate commensurate with the expected level of performance. Similar requirements apply to appointments to Temporary Summer Aid positions made between 1 May and 1 August. Appointments under this program are exempt from normal ceiling controls.

3. Both appointing authorities require that students be at least sixteen years of age. Appointment of a son or daughter of an Army civilian employee or the son or daughter of a member of its uniformed service is prohibited for summer or student employment in the United States. Exceptions to this prohibition based on severe physical handicap or specific income criteria are outlined in FPM Chapter 213, Appendix G.

4. A screening of applicants referred to and employed by Department of the Army under the President's Youth Opportunity Stay-In-School Campaign may provide a source of applicants who might successfully be placed in a Research and Engineering Apprenticeship. However, Stay-In-School Campaign applicants may not be denied Army employment based upon their lack of appropriate background for the Research and Engineering Apprenticeship Program.

INFORMATION PAPER

SUBJECT: Student Employment and Work Study Program

1. In addition to the programs outlined in 7 February 1980 Information Paper, Subject: Appointing Authorities Appropriate for Research and Engineering Apprenticeships (In-House), DA participates in the following student employment programs which continue student employment/work-study options through (1) non-baccalaureate programs in 2 year community and junior colleges and technical insitutes, (2) baccaulaureate programs and (3) graduate degree programs. It must be emphasized that all such programs operate independently, with participation normally dependent on the recommendation or coordination of faculty members of participating schools. Thus an individual's participation in a student employment/work-study program at one academic level does not guarantee participation at the next higher academic level.

a. Federal Junior Fellowship Program

Schedule B, 213.3202(f)

FPM Chapter 213, 308, and 316

Federal Junior Fellows are hired with the expectation that they will return to work each summer and vacation period throughout their undergraduate study. They are not permitted to work part-time during the school year under this program. Positions are to provide progressively more responsible work each year. Candidates must be in the upper 10 percent of their graduating high school class, accepted for admission to a college or university, need an income in order to attend college, be interested in a Federal Career following graduation, and be nominated by their high school. They are to assist scientific, professional, or technical employees and are not to be placed in routine clerical positions. Junior Fellows are exempt from normal employment ceilings and may be noncompetitively converted to career-conditional appointments upon completion of requirements for a bachelor's degree.

b. Cooperative Education Programs for Nonbaccalaureate Students in 2-Year Educational Insititutions.

FPM 213 and 308

(1) Students may be employed under the Schedule B, section 213.3202(c) authority in certain occupations (e.g., Clerk-Stenographer, Secretary Biological Technician) for which there is a continuously high and geographically widespread need. Work normally must be scheduled on a full-time basis for each work period and part-time employment is not usually permitted. Students who attain the associate degree, are recommended by the employing activity, and meet all other requirements (e.g., written test, if applicable) may be noncompetitively converted to competitive service appointments at the GS-4 level. Conversion must be in an occupational series which was approved for Schedule B appointment prior to the student's graduation.

(2) Students whose major fields of study are not related to a high need occupation covered by Schedule B may be appointed under the Schedule A,

section 213.3102(g) or (q) authorities. These students may be employed on a part-time or a full-time basis. They are not eligible for noncompetitive conversion and must be terminated upon their graduation. These students should, however, be encouraged to compete for competitive service appointments under Office of Personnel Management announcements.

c. Cooperative Education Programs for Baccalaureate Students.

Schedule B, 213.3202(a)

FPM Chapters 213 and 308

Cooperative education in a long-established program which provides for periods of study interspread with periods of study-related work. The blend of academic study and work experience provided by cooperative education has many benefits. For the student, it lends relevancy to learning, provides a realistic exposure to career opportunities, allows for early adaptation to the work environment, and helps pay expenses during the school years. For employers, cooperative education permits selection for career jobs on the basis of proven performance, provides a means of directing students toward occupations that promise career opportunities, alerts supervising staff to new methods and concepts, and reduces the high rate of turnover that is characteristic of college graduates during the first 3 years on a job. Baccalaureate cooperative education students (students in 2-year or 4-year colleges who are pursuing a baccalaureate degree) are appointed at grades GS-2 through GS-5 to positions involving duties which will prepare the student for a career field related to his or her field of study. In order to use this appointing authority, Army activities must have a current written working agreement with each college or university providing cooperative students. Army activities are authorized to provide tuition support to certain cooperative education students as discussed in CPR 410. Students are carried on leave without pay during the periods they are attending school. This usually means that two students, alternating periods of work and study, can be employed in one position. Alternation of pairs of students in this manner enables Army managers to employ larger numbers of students since the two students count as one against authorized employment ceilings. Students may not work on a part-time basis except in unusual and rare work related instances. Upon completion of the cooperative education program, graduation from college, recommendation of the employing activity and meeting of all other requirements, cooperative education students may be converted noncompetitively to a career-conditional (or career) appointment at the GS-5 or 7 level. Conversion must be to a position in the same occupational area in which the student received training. If, because of space limitations, the employing activity is unable to convert the cooperative student, the student's name will be provided to command headquarters for possible assignment to another Army activity.

d. Cooperative Education Program for Graduate Students

Schedule B, 213.3203(b)

FPM Chapters 213 and 308

Appointments to cooperative education positions at the graduate level are made under provisions of the Schedule B, section 213.3202(b) authority in career-

related positions at grade GS-5 or GS-7 depending upon the qualifications of the individual student. Written agreements must be negotiated with each college or university furnishing graduate students. The length of appointments should be determined jointly by the Army activity and the school and should provide adequate time for students to complete requirements for graduate degrees. Such requirements, however, must not exceed 30 months for master's and 42 months for Ph.D degree candidates from the beginning of their educational program to the awarding of their degrees. Although most assignments should be completed on a full-time basis, part-time schedules may be arranged under certain conditions. Students who complete requirements for the advanced degree and have satisfactorily performed work assignments may, at the option of the employing activity, be noncompetitively converted to career-conditional (or career) appointments.

e. Legal Intern Program

Schedule A, 213.3102(jj)

FPM Chapters 213 and 308

Students who are candidates for J.D. or LL.B degrees may be appointed to legal intern positions at grades GS-5 and 7. The student must be attending law school on a substantially full-time basis. Appointments must be terminated upon the student's graduation from law school. After graduation, however, the individual may be considered along with other eligible applicants for excepted appointment as a Law Clerk or Attorney.

f. The Harry S. Truman Memorial Scholarship Program.

Schedule B, 213.3202(d)

FPM Chapter 213 and 308

The Harry S. Truman Scholarship Foundation, established by the Congress under P.L. 93-642 as the official memorial to honor the 33rd President, conducts an educational scholarship program designed to provide opportunities for outstanding students to prepare for careers in the public service. Each year, through nationwide competition, one scholarship is awarded to a resident in each of the 50 states, the District of Columbia, and Puerto Rico. Also, Guam, the Virgin Island, American Samoa, and the Trust Territories of the Pacific Islands represent a single entity. Therefore, 53 students are selected annually. These students are selected to participate in Federal, State, or local government career-related work-study programs and are appointable in the Federal service under Schedule B, section 213.3202(d). Agencies have the final responsibility for selection of students recommended to them by the Harry S. Truman Foundation. The length of the work-study assignment is determined jointly by the agency and the Foundation. Students may be non-competitively appointed to competitive service positions under conditions outlined in FPM 308.

ARO
UNIVERSITY RESEARCH PROGRAM
FOR THE
ARMY
HISTORICALLY BLACK COLLEGES (HBC)

BACKGROUND

PRESIDENTIAL MEMORANDUM (DIRECTIVE) FOR THE HEAD OF EXECUTIVE
DEPARTMENTS AND AGENCIES - 17 JANUARY 1979

IDENTIFY AREAS WHERE HBC CAN PARTICIPATE MORE EFFECTIVELY

CONSIDER CONTRACTS/GRANTS WHICH CAN BE LET WITHOUT COMPETITION

AUTHORITY

TASKING LETTER, DRCLDC, HQ, DARCOM, 6 NOV 1979, SUBJECT: ARO'S
UNIVERSITY RESEARCH PROGRAM FOR THE ARMY, W/INCL: MEMO FROM
DR. PIERRE, ASA (RD&A), 26 OCT 1976

OBJECTIVE

THE INITIAL OBJECTIVE OF THIS PROGRAM IS TO ACTIVELY CULTIVATE
PREVIOUSLY UNTAPPED RESOURCES AT HISTORICALLY BLACK COLLEDGES
(HBC'S)

UPTAPPED RESOURCES

106 HISTORICALLY BLACK INSTITUTIONS

30 AMERICAN INDIAN INSTITUTIONS

20 MEXICAN AMERICAN INSTITUTIONS

25 PUERTO RICAN INSTITUTIONS

1 CUBAN INSTITUTION

1200 UNIVERSITIES AND COLLEDGES THAT HAVE NOT PARTICIPATED IN THE ARO
RESEARCH PROGRAM

UNIVERSITY RESEARCH PROGRAM FOR THE ARMY
(ASSISTANCE AND ACQUISITION) FUNDING GOALS

FY-80 - \$ 0.5M

FY-81 - \$ 0.9M

PROGRAM SURFACING TECHNIQUES

- o PROGRAM WAS INITIATED WITH SEMINAR ON 10 JANUARY 1980 FOR HBC'S WITH IMPLEMENTATION SCHEDULE FOR THE 80-81 ACADEMIC YEAR
- o INFORMATION PACKETS CONTAINING APPLICATION INSTRUCTIONS, PROGRAM GUIDE, AND CONTRACT BROCHURE WERE SENT TO HBC'S AND OTHER UNTAPPED RESOURCES
- o VISITS TO INSTITUTIONS
- o TELEPHONE CALLS TO POTENTIAL RESEARCHERS
- o ADVERTISE PROGRAM IN SCIENTIFIC MAGAZINES

CRITERIA FOR EVALUATION
OF PROPOSAL FOR GRANTS PROGRAM

SCIENTIFIC MERIT - PROPOSED RESEARCH SHOULD LEAD TO EXTENSION OF KNOWLEDGE AND RESULT IN PUBLICATION IN REFEREED JOURNALS

RELEVANCY - PROPOSED RESEARCH MAY HAVE SHORT- OR LONG-TERM IMPACT ON ARMY CAPABILITIES. THE REQUIREMENT FOR LONG-TERM IMPACT WOULD BE SATISFIED IF THE GRANT PROVIDES AN OPPORTUNITY FOR PREPARATION FOR FUTURE RESEARCH IN AN AREA OF MORE DIRECT INTEREST TO THE ARMY

PROGRAMMATICAL CONSIDERATION - EMPHASIS AND BALANCE OF PROGRAM

POTENTIAL OF INVESTIGATOR TO COMPLETE IN MAIN STREAM OF SCIENTIFIC RESEARCH - AFTER TWO OR THREE YEARS INVESTIGATOR SHOULD BE IN A POSITION TO PRESENT COMPETITIVE PROPOSAL

FUNDING LIMITATIONS - BUDGETARY RESTRICTIONS

STATUS OF UNIVERSITY RESEARCH PROGRAM
FOR THE ARMY FY 80

- o FOURTEEN HBC PROPOSALS HAVE BEEN ACCEPTED FOR \$424,955
- o THREE OTHER UNTAPPED INSTITUTION PROPOSALS HAVE BEEN ACCEPTED FOR \$94,888
- o TOTAL FY 80 FUNDING \$519,843

STATUS OF UNIVERSITY RESEARCH PROGRAM
FOR THE ARMY FY 81

- o TEN HBC SECOND YEAR FUNDING \$366,992
- o THREE OTHER UNTAPPED INSTITUTIONS SECOND YEAR FUNDING \$80,273
- o TOTAL FY 81 COMMITTED FUNDING (AS OF 24 NOV 80) \$447,265
- o FIVE PROPOSALS ARE UNDER REVIEW FOR \$152,099

APPENDIX D

The U.S. Navy Science and Engineering Apprenticeship
Program for High School Students, Summer 1980

The Navy participated in the DoD Program through its contract research arm, the Office of Naval Research (ONR), and through its in-house laboratories. Each laboratory appointed its own apprentices from its locality. The Naval Research Laboratory incorporated this program with an annual program for gifted students that existed with the American University. The American University program is sponsored by the National Science Foundation.

This Appendix consists of:

- o A Letter Report from the Office of Naval Research
- o Memorandum Report from the Naval Research Laboratory
- o Memorandum Reports and Comments from:
 - *** Naval Surface Weapons Center
 - *** Naval Underwater Systems Center
 - *** David W. Taylor Naval Ship Research and Development Center
 - *** Naval Air Development Center
 - *** Naval Personnel Research and Development Center
 - *** Naval Coastal Systems Center
 - *** Naval Weapons Center
 - *** Naval Ocean Systems Center

DEPARTMENT OF THE NAVY
OFFICE OF NAVAL RESEARCH
ARLINGTON, VIRGINIA 22217

19 November 1980

FROM: Robert Ryan, ONR Code 400R TO: Al Bottoms, ODUSDR&E(R&AT)

SUBJECT: ONR Apprenticeship Program; report on summer of 1980

Encl: (1) ONR Apprenticeship Summary

1. At your request I have put together some information on the Apprenticeship Program from last year. The material is displayed as enclosure (1).
2. I believe that we reported 10 apprentices for last summer. I was able to track down only 8 due to people being away from the office.

R.D. RYAN
Staff Assistant (Research)

OWR APPRENTICESHIP SUMMARY

<u>NAME</u>	<u>GROUP</u>	<u>RESEARCH ORGANIZATION</u>	<u>STUDENT ACTIVITY</u>	<u>MENTOR</u>
KYLE, H	Black Male	Portland State U., Ocean Technology	Orientation, computer programming on cable dynamics and other problems	Prof. Herman Migliore
CARLA, W	Black Male	Portland State U., Ocean Technology	Orientation, computer programming including computer	Prof. Herman Migliore
JOSEPH, J	Black Male	Catholic U., Human Performance Lab.	Learned to program BASIC, collected experimental data, participated in seminar on lab's research	Prof. James H. Howard
KENNETH W.	Black, Male	Louisiana State U.	Data reduction, graph plotting, data entry to computer	Profs. Steven Murray, Oskar Huh, Lawrence Rauss
SHERELLITA, H	Black, Female	Louisiana State U.	Data reduction, graph plotting, data entry to computer	Profs. Steven Murray, Oskar Huh, Lawrence Rauss
OSVALDO, P	Hispanic, Male	Lehigh U.	Work on corrosion protective coatings	Pro. Henry Leidheiser
TERRI, S	Female	Lehigh U.	Work on corrosion protective coatings	Prof. Henry Leidheiser
FERNANDO, W	Hispanic, Male	Miami	Tag sharks in the field	Prof. Samuel Gruber

Encl (1)

NAVAL RESEARCH LABORATORY
WASHINGTON, D.C. 20375

From: Naval Research Laboratory

Subject: DoD Science and Engineering Apprenticeship Program Review

The Naval Research Laboratory's 1980 Apprenticeship Program

- a. Target Number: 10
Apprenticeship awarded: 28 (June 1980)
- b. Mentors:
- c. Method of Recruitment:
 1. Students - American University recruited students throughout the metropolitan area with flyers (attached) sent to high school science teachers and counselors, with personal visits to the schools, through the area science fairs, and through recommendation of previous years participants.
 2. Mentors: The N.R.L. program coordinator used lists of mentors from previous years programs, new names by project interest on the student applications. Mentors suggested other names.
- d. Pre-program activity
 1. Prospective Students: Mentors screened applications and interviewed students. American University sent the acceptance letter and other program materials.
 2. Mentors: NRL Coordinator sent memo instructions on program goals and allowed activities. Many phone conversations augmented the memos.
 3. Intellectual Support: Weekly lunch hour seminars with films and guest speakers. Two tours to the Naval Academy and Carderrock. Video-tape college courses were available during lunch hours for SAT preparation and other scientific interest.

Mentors, A.U. supervisor, and NRL Coordinator were always available to discuss problems, offer advice, and give subject matter assistance. Carpools also served this purpose.

e. Evaluation Criteria and Measures:

1. Students: Final report, given orally at AU seminar, written report, and evaluation forms.

2. Mentors: Evaluation forms.

f. Plans to Track: Through newsletters of NRL activity, Science Club participation, personal contact, and further jobs during school and vacations (stay-in-school and summer aids).

MEMORANDUM

Date: 1843-102:JCH:emc
20 May 1980

1843, Jan Hart

SUBJECT: Summer High School Programs

TO: Potential Mentors

1. NRL has set up two research participation programs this summer for high school students with science and engineering potential. American University is supervising the students and helping with the educational enrichment.
2. Both of these programs are for high ability high school students, with one primarily designed to encourage groups presently under-represented in science and engineering (women, minorities, socially disadvantaged). The project and operating procedures for both programs will be similar.
3. You are being asked to act as a mentor to one of the students. You may look over the application and consider whether you have projects going on that will suit this student's interest. (Remember that students at this age frequently are unsure of what their interests are - except generally. The point of these summer projects is to show them what real science and research are like.) When you have decided about the student (you may phone the student and have him/her come in for an interview), call my office (X72956). We will inform American University (they formally advise the student).
4. We do not want to make this program a burden on you or too time-consuming. But we do want to encourage these young people to select careers in science and engineering (especially at NRL).
5. The program runs from June 23 to August 15. More instructions will be sent to you later. If you have any questions, please call me on X72956.

JANICE G. HART, Head
Science Education Section
Employee Development Branch
Civilian Personnel Office

NAVAL RESEARCH LABORATORY
SUMMER HIGH SCHOOL RESEARCH PROGRAMS

Programs: A. Jr. Research Scientists (A.U. Research Participation Program)

B. Research Apprentices (DOD Science and Engineering Apprenticeship Program)

Objective: To encourage more talented young people to consider science and engineering as careers - especially at NRL.

To ensure an adequate supply of future scientists and engineers especially from the presently underrepresented groups.

How: These programs demonstrate to the high school students what research really is by allowing them to work with scientists in their laboratories and to participate in ongoing research.

Participants: Program A is designed for an high potential high school student interested in science and engineering.

Program B is designed for students from groups now underrepresented in science and engineering (minorities, women, socially and economically disadvantaged).

Scientists: Those NRL scientists who are

1. interested in helping students
2. working on unclassified projects that students could participate in
3. prepared to teach some science
4. volunteers

Tasks: American University

1. recruits
2. selects
3. refers
4. administers
5. pays
6. supervises

7. helps with educational seminars

NRL scientists will act as preceptors on the scene; that is, the NRL scientists will

1. explain the procedures of the project
2. define what aspects the students may work with
3. teach the methods of equipment use
4. help with problems
5. lead the students to the reference materials
6. perhaps participate in the program seminars and tours
7. advise the students on classes and schools the students may want in order to train as scientists
8. provide technical guidance for the student's science fair project
9. write recommendations in the future

NRL - Training Code 1843

1. coordinates
2. arranges tours, seminars, speakers, rooms, and writes internal reports.

AMERICAN UNIVERSITY - NRL SUMMER STUDENT PROGRAM SEMINAR SCHEDULE

- July 2 "Connections", a film on "The Trigger Effect".
"Second Time Around", a talk by Steve Lloyd, Tony Nesky, and Jackie Valliant who were students from last year's A. U. summer science program and now employed at NRL.
Mrs. Elaine Shafner, NRL employee and former advisor to the Washington Junior Academy of Science, on advantages of participation in the Academy of Science activities..
- July 9 Dr. Dave Allison with the film "Faith In Numbers" and discussion on science and society.
- July 16 Dr. Dave Venesky on "Basic Research - How It Works At NRL"
Jan Hart, Nic Lanzetta, and Ed Powell on various employment opportunities at NRL for students.
- July 22 Field Trip to the U.S. Naval Academy at Annapolis.
- July 30 Dr. Dave Allison with the film "Yesterday, Tomorrow and You" and further discussion on technology and change.
- Aug 6 Ben Early of the National Space Club on scientific education.
Joel Morris of NOL (formerly of NRL) on careers and employment in engineering and science.
- Aug 12 Field Trip to Carderock.
- Aug 13 NRL Program reports.
- Aug 15 Program participants' reports at American University.
- Aug 18 Field Trip to Chesapeake Bay Detachment (tentative).

THE AMERICAN UNIVERSITY

Summer Research Participation Program
Judith S. Sunley, Director

TWENTY-FIRST RESEARCH PARTICIPATION PROGRAM
FOR SENIOR HIGH SCHOOL STUDENTS

To Student Applicants

The Summer research program for which you are applying is unique in several aspects. It provides high school students with the opportunity to experience the world of scientific research as an active participant. All our participating laboratories. They work in close contact with one of the laboratory researchers, generally on continuing projects and occasionally on projects specifically designed for them. This opportunity to gain work experience and learn what scientific research is like is one that is rare and we are pleased that the National Science Foundation and the Maryland State Department of Education provide the funding that makes this program possible.

The Director and her committee will attempt to the best of their abilities to locate you physically in a research laboratory close to your home and matched as closely as possible to your scientific interests. On the other hand, this is sometimes not possible. You have the option of refusing an assignment.

There will be an orientation meeting at The American University at the beginning of the program. After this meeting you will be expected to report "on the job" and work a full day for an eight-week period alongside your sponsoring scientist. During this period you will receive regular visits from a staff associate.

All students participating in the commuting program will receive a stipend of \$80.00. Some additional amounts are available on the basis of need. Additional funds may be requested from the Director. The amount of money requested, whether large or small, will in no way affect the participant decision procedure.

Please note that this program is for commuting students only. Out-of-town applications will not be considered unless applicant have made arrangements to live in this area during the summer. An unambiguous statement to this effect must be submitted to the Director. An exception to this rule will be for student selected through the Maryland State Department of Education who will be housed at Frederick, Maryland.

It must be clearly understood that your acceptance of the research assignment implies that you will not get time off for vacation, travel, an acceptance of other awards, or prolonged attendance at other ceremonies during this period. If you have any specific questions, address them to the Director: Dr. Judith Sunley, The American University, Mathematics Department, Washington, D.C. 20016, or call (202) 686-2393.

WASHINGTON JUNIOR ACADEMY OF SCIENCE

Application Form A-1

for

THE AMERICAN UNIVERSITY SUMMER SCIENCE PROGRAM RESEARCH PARTICIPANTS

1101 North Highland St.
Arlington, Va. 22201

NAME _____

ADDRESS _____

PHONE NO _____ () _____ ZIP CODE _____

SCHOOL _____ GRADE _____

COUNTY/REGION _____

A WJAS newsletter will be sent to you at the start of the 1980-81 school year (Sept. or Oct.). Your membership will commence upon payment of your dues at one of the WJAS meetings.

Meetings are usually monthly. In the past, meetings have been held at The American University, Georgetown University, the Smithsonian Institution, Arlington County School's Planetarium, WM. Schmidt Environment Center, Owens Science Center, NASA Goddard Space Flight Center, National Zoological Park, Children's Hospital, National Gallery of Art, and in the Blue Ridge Mountains.

ACTIVE, rather than passive participation in WJAS is encouraged.

PLANS TO PRESENT YOUR RESEARCH PAPER AT ANY OF THE FOLLOWING.

1. (A) Georgetown University Junior Science & Humanities Symposium Brief formal paper with abstract & graphics. Deadline about 11/15.
For information, contact Dr. Ed Finn, Physics Dept. Georgetown
- (B) Washington Junior Academy of Sciences Christmas Convention Submit brief formal paper to Georgetown JSHS. If selected, must present paper. Deadline for submission approx. 11/15.
2. Maryland Academy of Science Junior Science & Humanities Symposium
MARYLAND RESIDENTS ONLY. Submit brief paper (15 minutes) and abstract about 25 words. Check deadline date.
3. Regional Science Fairs (March and April).
Have your project ready to February; individual school qualifying fairs are held earlier. Grand Prize winners compete in the International Science and Engineering Fair.
4. George Washington Univ. Science & Engineering Fair - usually held end of April
5. Washington Technical Writing Contest.
6. Westinghouse Science Talent Search ... apply EARLY; deadline 12/15
7. American Chemical Society Mini-Meeting. Usually held middle of April

TWENTY-FIRST SUMMER SCIENCE PARTICIPATION PROGRAM FOR HIGH ABILITY
SECONDARY SCHOOL STUDENT WASHINGTON, D.C.
THE PROGRAM SPONSORED BY THE AMERICAN UNIVERSITY

INSTRUCTIONS TO PARTICIPANTS: Each participants in the High School Research Participation Program will please fill out the following questionnaire and mail it to Ms. Carol McCreary, Department of Mathematics, Statistics and Computer Science, The American University, Clark Hall, Room 205, Washington, D.C. 20016, BEFORE MONDAY, AUGUST 11.

I. To which of the following were you exposed during your summer research project. Check those appropriate.

1. Philosophy of research
2. Use of experimental checks and controls
3. Methods of measurement
4. Design of equipment for special purposes
5. Calibration of reagents, standards and measuring devices
6. Record keeping and data recording
7. Graphs of functional relationships
8. Processing of data
9. Use of computers in data processing
10. Use of computers as an experimental tool
11. Computer programming
12. Design of an experiment; isolation of a problem
13. Use of scientific literature; library searches
14. Ways in which exploration of a research problem leads to new questions.
15. Team work in scientific research
16. Training in related disciplines

Of the above which were most important? List of 3 or 4. Why?
Please list comments on the back of this sheet.

For parts II and III, please evaluate each item by placing a number after it according to the following scale.

Much 3 Somewhat 2 Little 1 NA 0

II. Has your experience as a participants in this program contributed to your personal development in the following ways?

1. Working relations with adults. _____
2. Job responsibility. _____
3. Better understanding of scientific principles. _____
4. Scientific vocabulary. _____
5. Ideas you can investigate further at end of program .. _____
6. Laboratory skills and techniques. _____
7. Insights into career opportunities in science _____
8. Better understanding of your own interest and
abilities _____
9. Personal satisfactions possible in research _____
10. Comments _____

(Use back of this sheet if more room is needed)

III. To what extent did you benefit from the following assistance?

1. Planned lectures on or explanations of the work _____
2. Tours of the laboratories _____
3. Informal talks with your preceptor. _____
4. Help from other workers in your laboratories. _____
5. Answers to your questions _____
6. Group planning sessions _____
7. Observations of what scientists do and how they work. . . _____
8. Other (be specific) _____

IV. List the techniques and instruments new to you which you used or with which you became familiar this summer. (Examples of techniques: computer languages (FORTRAN, BASIC, etc.), vacuum filtration, pipetting. Example of instruments: computer terminal calculators, precision balance, mass spectrometers.)

V. What did you like best about the program? Why?

What did you least about the program? Why?

What suggestions have you for the laboratories and for the Directors for the continuation of the program?

TWENTY-FIRST SUMMER SCIENCE RESEARCH PARTICIPATION PROGRAM

FOR HIGH-ABILITY SECONDARY SCHOOL STUDENTS

THE AMERICAN UNIVERSITY, WASHINGTON, D.C., 1980

Will you please indicate your judgement of the achievement of high school students(s) whom you, as preceptor, helped and directed in the 1980 Summer Science Research Participation Program for secondary school students. Since only limited information can be secured from this questionnaire, we hope that you will add comments and suggestions that will help us to evaluate this program and to plan for next year. This questionnaire is confidential. When you have completed this questionnaire, please mail it to Ms. Carol McCreary, Mathematics Department, American University, Washington, DC 20016.

1. Did the student's performance conform to your estimate of his/her background?
2. Did the student contribute to the work of your department?
 Much _____ Somewhat _____ Little _____ Not at all _____
3. How do you rate the student's adjustment to and growth in understanding of the work in your laboratory?
 Excellent _____ Good _____ Fair _____ Poor _____
4. In your opinion, has the student's work in your laboratory contributed to his/her understanding of the nature of scientific research?
 Much _____ Somewhat _____ Not at all _____
5. Are you in favor of a continuation of this program next summer?
 Yes _____ No _____
6. What were the age and educational background of your student?
7. What age and background would you prefer should you take a student another year?
8. If you have any suggestions or comments on the program, we would most appreciate them. Use the back of the form if necessary.

NAVAL SURFACE WEAPONS CENTER
Dahlgren, Virginia

2 June 1980

FROM: NSWC - Human Resources Development Division

TO: NAVMAT 08L

SUBJECT: Report on DoD Science and Engineering Apprenticeship Program

- A. Number of apprentices allocated to the Center - 21
- B. Number selected to date - selections will be made this week
- C. All will be appointed by 25 June 1980
- D. Number of journeymen mentors - 20
- E. One remaining vacancy will be filled by 25 June 1980
- F. Procedures used in selecting students and in determining interests and aptitudes:

Representatives of NSWC visited selected schools in the vicinities of the two sites (thoses with large minority enrollments) and talked to counselors and students. They carried with them descriptive recruitment literature about the Center and job application forms. The counselors had been asked to publicize the program and identify prospective candidates. Each student interested was assisted in completing the SF171 and asked to provide a recommendation from a teacher and the high school transcript. Applications were accepted from all who were interested.

- G. Mentors will make assignments of work, provide on-the-job training and generally supervise the apprentices' work. They will also provide guidance and advice on the students' adjustment to the work force and the laboratory environment. They will be alert to any needs for remedial or general strengthening of basic skills and ask for help in providing it. They will counsel the apprentices on a continuing basis and provide an evaluation at the close of the summer. They will arrange for field trips or other enrichment activities as may be appropriate.
- H. A group session is planned at the beginning of the season and another for evaluation and summary purpose at the close.
- I. An evaluation form similar to the one used for Upward Mobility trainees is proposed at the close of the work period.

J. Monitoring and Tracking:

1. Records will be kept on each student.
2. Checks will be made through the schools of the students' pursuit of a scientific curriculum and of their progress.
3. If advisable, an offer of employment will be extended for next summer (or during holidays).

MIRIAM SHERWIN
Program Coordinator

NAVAL UNDERWATER SYSTEMS CENTER
NEWPORT R.I. 02840

13 June 1980

From: Deputy EEO Officer
To: Chief of Naval Material (MAT 08L), Navy Department, Washington, DC
Subj: DoD Science and Engineering Apprenticeship Program
Ref: (a) CHNAVMAT Msg 211340Z May 80

1. In accordance with reference (a) the following information is provided.

- a. Number of Apprenticeship quotas allocated to Center 10.
- b. Number of Students selected for Program to date 10*.
- c. If vacant quotas remain, will they all be filled prior to 25 June 1980 (See * below).
- d. Number of Journeyman Mentors selected to date 10*.
- e. If mentor vacancies remain, will they be filled prior to 25 June 1980? (See * below)

* The number of quality students and positions identified exceeds the allocated quota of ten. Naval Underwater Systems Center (NUSC) is therefore attempting to make additional pairings of students and mentors.

f. Local high officials were contacted and presented written material descriptive of the program. The school officials referred students with course load and grade point average that were indicative of interest and aptitude re science/math. The students were then briefed on the program and filed application thereto.

In addition, students presently participating in the stay-in-school program were reviewed for possible interest/aptitude re the program.

Interviews of the students allowed for some preliminary matching with mentors on the basis of interests.

g. The mentors will be using a variety of approaches to guide and enrich the apprentice. Each mentor has developed his own "program" which is reviewed by the department's "technical representative" whose task it is to ensure that the individualized plan is properly focussed. In general, the mentors are using a team approach. In some situations the apprentice is with the mentor on a near constant basis while in other situations the mentor maintains close cognizance of the apprentice's efforts while working with several individuals in several skills areas.

h. Centralized support being made available to mentors and apprentices include Center orientation materials, specific course/skills, related video tapes and programmed learning modules, and an administrative method for producing documented training/exposure package that will outline the anticipated FY80 experience for each apprentice.

i. The training/exposure package mentioned in item (h) will be the basis for evaluation.

j. Having begun the process via high school counselors will expedite follow-up. It is anticipated that the apprentices will be made job offers appropriate to their situation, such that a continued bond is developed between apprentice and NUSC.

KENNETH H. McDANIEL

NAVAL UNDERWATER SYSTEMS CENTER
Newport, R.I. 02840

21 August 1980

Mr. A. Bottoms
1702 Maple Hill Place
Alexandria, Virginia 22301

Dear Al:

Participation in the Research Apprenticeship Program was an excellent experience for me and I think it was also for Brian. I will volunteer to do it again. Having him live in with us allowed much more to be achieved in the mentor role, and we got to know him quite well. He is the same age as our youngest son and they became good friends. Brian is a bright, adaptable, motivated, and very conscientious high school junior who should seriously consider a career in science and technology with the government. I think he is a good model of what the higher goals and objectives of the Program are trying to reach. The Center would be fortunate to hire more individuals of his caliber.

I think he is capable of succeeding in a first-rate college. The future will not be easy for Brian, however. He is the oldest of six children. His parents have no college experience and a family income substantially less than the national average. A significant question remaining now, for the framers of this Program, is what is to be done next for the rest of this year's apprentices to turn hope into a practical reality.

The enclosed are some notes on Brian M 's Research Apprenticeship which you requested 19 August.

H.J. DOEBLER

Enclosure

Employment

Brian arrived 9 July and stayed with us until 19 August. He was employed at NUSC from 14 July through 18 August. In my work with the CIDS Program, I keep in frequent contact with offices all over NLL so it was an easy matter to arrange several short experience tours of different kinds of Brian. Some specifics:

- o 1-week of electromagnetic data reduction. He also got a tour of the Periscope Lab and other major facilities in Code 34.
- o 1-day of working with the oceanographers preparing for a scientific buoy emplantment. (Scheduling prevented Brian from actually taking part in the at-sea phase.)
- o 2-weeks of working with the Lab Computer Facility in which he was able to learn to operate some of the equipment and assist in production. He did some programming and worked with graphics.
- o 1-week of working with the Dodge Pond Calibration Facility in which he got hands-on experience with instrumentation, measurements, and underwater acoustics.

Other Experience

We were able to take Brian on a tour of the U.S. Coast Guard Academy, Mitchell College, Connecticut College, and the Mystic Aquarium. Also, we spent a half day at the Woods Hole Oceanographic Institution and were given a detailed tour by a senior scientist (Dr. Vine).

Lesson Learned

- o Mentors with children the same age have an easy job. My role as mentor and our participation as a host family was greatly facilitated by our having teenagers of our own. We have been discussing and actively planning college educations with our own children for the past two years.
- o Neither Brian nor our young son is a licensed driver at present. I feel that this helped us avoid a large area of concern as a host family.
- o A legitimate need for a security clearance exists. The student's role as a Research Apprentice requires involvement with NUSC projects as a team player and not as a clerk or messenger. Access to many or most interested apprenticeship experience at NUSC will not be available without a clearance.
- o A security clearance makes use of flexitour (flexible working hours) permissible. Flexitour provided the adaptability for daily work shifts necessary to facilitate the various assignments for Brian during the summer. It served a constructive purpose and was not merely a convenience for apprentice. Each of the supervisors he worked for participated in either a floating 40 or Flexitour themselves because their work had a variable schedule.

DAVID W. TAYLOR NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER
BETHESIDA, MARYLAND 20084

24 June 1980

From: Commander, David W. Taylor Naval Ship R&D Center
To: Chief of Naval Material (MAT 08L)

Subj: Reporting Requirements on DoD Science and Engineering
Apprenticeship Program

Ref: (a) CHNAVMAT msg 211340Z May 80

1. The following information is provided as requested by reference (a):

<u>Name of selectee</u>	<u>Age</u>	<u>S&E area*</u>	<u>Mentors</u>
Allen, Robert	17	ME	Neild, A.
Daniel, Deborah	16	ME	Breiter, M.
Easton, Van	16	ME	Petrisko, E.
Gaither, Irving	16	Mat E	Pollack, A.
Garrett, Jerome	16	AE	LeBeau, R.
Gaskins, Dana	16	AE	LeBeau, R.
Heigh, Sherman	16	ME	Allwein, D.
Jones, Richard	17	ME	Nishida, K.
Kinlow, Michael	16	NA	Ochi, M.
Knott, Rudolph	17	AE	LeBeau, R.
Lee, Tiffany	16	EE	Decatur, R.
Lim, Eric	16	EE	Smith, R.
Myrick, Douglas	17	ME	Ward, J.
Odum, Kenny	17	ME	Pierpoint, J.
Phelps, Kirsoun	16	Env E	Christian, D.
Savage, Francine	16	CS	Haas, M.
Spruill, Kevin	16	Chem	Yeager, W.
Taylor, Orlando	17	ME	Schoeller, R.
Wiggons, Douglas	16	ME	Tewes, W.

*S&E area refers to:

ME-Mechanical Engineering
Mat E-Materials Engineering
AE-Aerospace Engineering
NA-Naval Architecture
EE-Electronic/Electrical Engineering
Env e- Environment Engineering
CS-Computer Science
Chem-Chemistry

2. All of the above selectees were recruited from local high schools, where they have completed eleventh grade and are taking classes in the areas of mathematics and science.

3. Information requested on the mentors is as follows:

<u>Mentor</u>	<u>GS Series & Grade</u>	<u>Organizational title code</u>	<u>Highest degree/ field</u>
Neild, A.	GS-830-14	Head, Power Transmission Branch, 2723	BS in Engineering
Breiter, M.	GS-802-12	Engineering Technician; 1720.3	
Petrisko, E.	GS-801-14	Head, Control & Stimulation Branch, 2731	BS in Engineering
Pollack, A.	GS-806-14	Head, Ferrous Metal Fabrication Branch, 2821	MS in Engineering
LeBeau, R.	GS-861-13	Aerospace Engineer, 1611	MS in Engineering
Allwein, D.	GS-830-14	Head, Machinery Stress Analysis Branch, 2744	BS in Engineering
Nishida, K.	GS-810-13	Structural Engineer, 1720.1	BS in Engineering
Ochi, M.	GS-871-14	Head, High Performance Craft Dynamics Branch, 1572	BS in Physics
Decatur R.	GS-855-12	Electronics Engineer, 2960	MS in Engineering
Smith, R.	GS-850-13	Electrical Engineer, 2714	BS in Engineering
Ward, J.	GS-830-14	Head, Mechanical Systems Branch, 2722	BS in Engineering
Pierpoint, J.	GS-801-14	Head, Machinery Noise Branch, 2741	MS in Engineering
Christian, D.	GS-408-09	Ecologist, 2865	BS in Biology
Haas, M.	GS-334-13	Computer Specialist, 1843	MS in Engineering
Yeager, W.	GS-1320-11	Chemist, 2865	BS in Chemistry
Schoeller, R.	GS-830-14	Heads, Silencing Application Branch, 2743	BS in Engineering
Tewes, W.	GS-830-13	Mechanical Engineer, 2724	BS in Engineering

J.E. MULVANY
By direction

30 May 1980

From: Commander, David W. Taylor Naval Ship R&D Center
To: Chief of Naval Material (NAT 08L)

Subj: Reporting Requirements on DoD Science and Engineering
Apprenticeship Program

Ref: (a) CHNAVMAT msg 211340Z May 80

1. The following information is provided as requested by reference (a):
 - a. Ten quota
 - b. Nineteen selected and appointed
 - c. Not applicable
 - d. Nineteen
 - e. Not applicable
 - f. Virtually all Carderock apprentices were recruited from Ballou High School in Washington, DC, which serves as a specialized math/science school for students from all over the city who excel in those areas. Recommendations from the school were considered which involved interviewing by a DTNSRDC senior engineer and personnel representative and evaluation of academic records and test scores. Process in Annapolis was similar except several schools were used and one senior engineer (minority) interviewed, evaluated, and selected applicants.
 - g. Mentors will review work assignments for apprentices to ensure that they do not conflict with their level of understanding, that they provide meaningful and progressive work challenges and provide relatively broad exposure to the field of engineering.
 - h. Tours of both the Carderock and Annapolis facilities are planned as well as trips to other Navy activities such as the Norfolk Naval Shipyard (or local activities as current travel restrictions may dictate).
 - i. Mentors and technical and personnel representatives will have formal and informal meeting throughout the summer to evaluate the effectiveness of the program and modify where needed. A broad overview will be conducted upon completion to determine areas which need improvement as well as those programmatic aspects which were particularly effective.

- j. Apprentices will be monitored and tracked in their individual development and academic careers both through the cooperative education departments of the colleges they attend as well as personal counseling by mentors during work periods.

R. B. HAMILTON
Acting Director of Civilian Personnel

NAVAL AIR DEVELOPMENT CENTER
WARMINSTER, PA. 18974

26 June 1980

From: Commander, Naval Air Development Center
To: Chief of Naval Material (MAT-08L)

Subj: DOD Science and Engineering Apprenticeship Program; report of

Ref: (a) CHNAVMAT msg 211340Z May 80
(b) CHNAVMAT ltr 08L2/WBC Ser 251 22 May 80

1. As requested by references (a) and (b), the following information is submitted:

a. Eight (8) apprentices were selected for the subject program and began work 23 June 1980.

2. Requested information on selectees follows:

a. Norris Anderson, age 16
High School major: academic; completed sophomore year (Grade 10)
Referred by: Guidance Counselor
Upper Dublin High School
Fort Washington, PA

Scientific and Engineering area: sonobouy development and testing

b. William Darryl Camp, age 16
High School major: academic; completed junior year (Grade 11)
Referred by: Guidance Counselor
Simon Gratz High School
Philadelphia, PA

c. Jorge Carabello, age 18
High School major: academic; completed junior year (Grade 11)
Referred by: Guidance Counselor
Thomas Edison High School
Philadelphia, PA

Scientific and Engineering area: computer display technology

d. Jacqueline Hartman, age 17
High School major: academic; completed junior year (Grade 11)
Referred by: Guidance Counselor
Neshaminy School District
Pendel, PA

Scientific and Engineering area: sensor system technology,
signal/data processing

- e. Kerry Johnson, age 16
High School major: academic; completed junior year (Grade 11)
Referred by: Guidance Counselor
Upper Dublin High School
Fort Washington, PA

Scientific and Engineering area: materials protection and application

- f. Olga Matos, age 17
High School major: academic; completed junior year (Grade 11)
Referred by: Guidance Counselor
Thomas Edison High School
Philadelphia, PA

Scientific and Engineering area: experimental vision research

- g. Israel Morales, age 17
High School major: academic; completed junior year (Grade 11)
Referred by: Guidance Counselor
Thomas Edison High School
Philadelphia, PA

Scientific and Engineering area: air and submarine navigation

- h. Michael Sutton, age 16
High School major: academic; completed junior year (Grade 11)
Referred by: Guidance Counselor
Simon Gratz High School
Philadelphia, PA

Scientific and Engineering area: computer software development

3. Requested information on mentors follows:

- a. Joseph M. McCandless, GS-855-13
Supervisory Electronic Engineer
Acoustic Development Division (Code 3044)
B.S. degree, Physics
- b. John Babiarz, GS-861-12
Aerospace Engineer
Aircraft Systems and Integration Division (Code 6013)
M.S. degree, Engineering Science
- c. Lewis Lipple, GS-855-12
Electronic Engineer
Computer Systems Technology Division (Code 5023)
B.S. degree, Electrical Engineering

- d. Sidney McCleary, GS-855-12
Electronic Engineer
Radar Division (Code 3023)
B.S. degree, Physics
- e. Ronald Trabocco, GS-1321-12
Metallurgist
Aero Materials Division (Code 6063)
M.S. degree, Materials Engineering
- f. Gloria Chisum, GS-180-14
Research Psychologist
Life Science Research Group (Code 6003)
Ph.D degree, Psychology
- g. John DeMatteo, GS-801-14
Navigational Systems Engineer
Ship and Submarine Navigation and Air Sensor Division (Code 402A)
M.A. degree, Engineering concentration
- h. Ruth Pickering, GS-1502-12
Mathematician
Fleet Software Engineering/Analysis Division (Code 504)
B.A. degree, Mathematics
M.S.E.E. (January 1981)

R.P. YOUNG
By Direction

30 May 1980

From: Commander, Naval Air Development Center
To: Chief of Naval Material (MAT-08L)

Subj: DoD Science and Engineering Apprenticeship Program; report of

Ref: (a) CNAVMAT msg 211340Z May 80

1. As requested by reference (a), the following information is submitted:

a. Eight apprenticeship quotas were allocated to the Naval Air Development Center.

b. As of 30 May 1980 no students have been selected for the programs. Selection will be made the week of 2 June 1980.

c. All quotas should be filled by 25 June 1980.

d. Eight journeymen mentors have been selected to date.

e. Not applicable. All mentor positions filled.

f. Students were recruited through local high schools on the basis of aptitude for mathematics and science. Recommendations were sought from high school guidance counselors, and mathematics and science teachers. Special recruiting emphasis was placed on school with significant minority enrollment. The Deputy Equal Employment Opportunity Officer and a high level scientist at NAVAIRDEVCON visited local schools to interview applicants and to assess interest, academic aptitude and to assess likelihood of benefiting from the program. Final selection of student will be made as result of these recommendations.

g. Mentors are representatives of the Center technical departments. Attention was given to ability to work well with young people as well as an understanding of technical programs and department projects that would provide apprentices stimulating work assignments. Mentors will oversee work assignments, and provide counseling to students on college entrance matters.

h. Group activities planned for apprentices include:

(1) Participation in afternoon program for two weeks at an area community college to provide supplemental reading and mathematics skill development and orientation to college programs.

(2) A series of regularly scheduled seminars on major programs at the Center including visits to laboratory and test facilities.

i. Mentors and apprentices will submit written reports at the end of the summer assessing the progress of the program, including specific assignments, evaluation of group activities and recommendation for changes

of modifications of the program. The program will be reviewed by the program coordinator, Deputy EEO Officer and Associate Technical Director.

j. Progress of individual apprentices will be monitored by the program coordinator, ensuring job assignments are closely related to the individual's interests, aptitudes and academic studies.

R.P. YOUNG
By direction

Comments from students employed under the DoD Science and Engineering Apprenticeship Program at the Naval Air Development Center, Summer 1980.

Michael S., a student from Simon Grata High School, Philadelphia:

"I think working at NADC has encouraged me to follow up my decision to go to college. I have been working on the satellite (terminal) in the computer facility to assemble and test programs that have been created. If they are without errors, then I will get a paper tape listing. Then my mentor and I take them to the system to be run.

"I have created my own program that compares two tape cartridges. It consists of space-ahead, read and compare routines. I am currently running tests on it.

"This program has been quite satisfying for me. (My current education plan is to go to college and get a bachelor's degree in computer science.

Jacqueline H., student from Langhorne High School, Langhorne, PA:

"Until this summer, I had not even considered engineering as a career for myself. I was thinking of going into the performing arts. It was a good experience for me and it is a good way to get exposure to a possible career.

"When I first arrived at NADC, I had no previous experience with computers of any kind. I learned what an octal number was and how it was used in reference to a Tens Complement and binary numbers. I was taught how to read a flow chart and how to write my own.

"Later I got an assignment to write a program that was to be used as a quicker and easier way to find the code names for some reports.

"I also learned how to use a paper tape to get information onto a control screen, how to thread and run magnetic tape, how to edit a program and how to use a printer.

"I have really gotten a lot out of this experience. It has opened my eyes to all of the different jobs that are involved with computers and engineering."

Jorge C., student from Edison High School, Philadelphia:

"I assisted the engineers in whatever assignment I could. For example: drawing, typing in programs, running programs, working in hardware, and learning the different commands for each computer. I have learned a lot about computers and electronics; the way it really is and works. This was a great experience, and at the same time, the chance to feel what it is like to be an engineer."

Ogan M., student from Edison High School, Philadelphia:

"My goals were more like in a medical field than an engineering career, but I did have somewhat of an interest in engineering. My exposure to all the opportunities in the world of engineering has helped me decide upon my career. (I

plan) to apply for co-op program my interests are aerospace and chemical engineering. I have learned the concern in a vision lab to protect and enhance the vision of the pilot.

"I was exposed to various machines such as the radiometer, viometer, eye-tracker and other laboratory built equipment. All are used for optical evaluation. (I was) exposed to general office and lab procedures and also worked with the computer terminal in the lab.

"This summer my experience at NADC has had a great effect on me. It has made me aware of the career world and all the opportunities in it."

The Naval Air Development Center has participated in the Naval Material Command Centralized Cooperative Education Program (CCEP) for five years. The CCEP is an undergraduate program involving alternating periods of planned work experience at a Navy activity with related study at a participating university, leading to a bachelor's degree in engineering. The program funds tuition, books and fees for our full academic curriculum. In exchange, the student is obligated for 64 weeks of work with the Navy.

In fiscal year 1980 the Center, working with the Corporation for the Advancement of Experimental Learning Programs (AELP), participated in recruiting local high school students to apply for this program and to a participating university (currently 9 universities participate). The recruiting efforts resulted in three local students being selected for the program and starting as pre-coops at the Center, Summer 1980.

As part of the DoD Science and Engineering Apprenticeship Program, mentors were briefed on CCEP and local recruiting efforts and encouraged to discuss the possibility and advantage of this program with the apprentices. As a result, their apprentices have completed applications for the CCEP program and intend to apply to one or more of the participating universities. If selected for the program and admitted to one of the participating schools the students will be placed with the Naval Air Development Center as pre-coops in Summer 1981.

NAVAL PERSONNEL RESEARCH AND DEVELOPMENT CENTER
San Deigo, Ca. 92152

12 September 1980

From: Commanding Officer
To: Chief of Naval Material (MAT 08L2)

Subj: Research Apprenticeship Program

Ref: (a) CNM msg 211340Z of May 1980

1. Reference (a) requests a summary evaluation of the Research Apprenticeship Program. Initially the Center hired three apprentices. A fourth apprentice was to be hired; however, her appointment is being delayed pending proof of citizenship. One of the three apprentices on board this summer resigned recently because his schedule would not allow him to work during the school year. Now that school is in session we plan to recruit a replacement.

2. Overall our experience with the program has been positive. The students have particularly enjoyed special field trips to research and development/educational organizations such as Southwest Fisheries, NOAA, and the University of California at San Diego. The apprentices were given a general orientation to the Center and world of work (importance of getting to work on time, steps in carrying out an assignment, etc.). They also attended weekly seminars which were held to acquaint the apprentices as well as our summer employees with the functions of various groups on Center. Feedback from the apprentices indicates that all of these activities have been worthwhile. Another aspect of the program which has received considerable attention is that of appraisal. Training plans which identified specific performance factors were developed for the apprentices and are used to evaluate their progress.

3. Obviously the program is too new for an evaluation of its ultimate impact. However, we are encouraged and look upon the program as a real opportunity to work with students over a period of time and also to develop continuing relationships with some of the local schools.

CYNTHIA H. CASHORE
By direction

NAVAL PERSONNEL RESEARCH DEVELOPMENT CENTER
San Diego, Ca 92152

25 June 1980

From: Commanding Officer
To: Chief of Naval Material (MAT 08L)
Subj: Report of DoD Science and Engineering Apprenticeship Program
Ref: (a) CNM msg 211340Z May 80

1. In response to reference (a), the following information is provided,

a. Students selected:

- (1) Brian Sanders, age 17
High School Major: Computer Science and Mathematics, has completed 11th grade
Student referred by: San Diego City School Career Development Counselor
College Major: Mathematics/Engineering
- (2) Julie Bowen, age 17
High School Major: Computer Science and Mathematics, has completed 11th grade
Student referred by: San Diego City School Career Development Counselor
College Major: Psychology
- (3) Vincent Howard, age 16
High School Major: Computer Science and Mathematics, has completed 11th grade
Student referred by: San Diego City School Career Development Counselor
College Major: Mathematics

b. Mentors:

- (1) Ms Jeannine Wolf, GS-344-12
Computer Systems Analyst, Code 401
BA, Political Science
- (2) Dr. Robert Guthrie, GS-18014
Supervisory Personnel Research Psychologist, Code 310
PhD, Psychology
- (3) Mr. Thomas Enderwick, GS-180-13

Engineering Research Psychologist, Code 302
MS; General and Experimental Psychology

CYNTHIA H. CASHORE
By direction

From: Commanding Officer
To: Chief of Naval Material (MAT 08L)

Subj: Report on DoD Science and Engineering Apprenticeship Program

Ref: (a) CNM msg 211340Z May 1980

1. In response to reference (a), the following information is provided:

- a. No. of apprenticeship spaces allocated to the Center: 3
- b. No. of students selected: 3
- c. No. of journeyman mentors selected: 3
- d. Procedures used to select students and determine their interests and aptitudes: We initially contacted the Career Development Services Department, San Diego City Schools; outlined the program; and specified the requirements for students to be considered. It was suggested that we meet with the counselor assigned to Gompers High School, which specializes in mathematics, science, and computer science curricula. Students from anywhere in the city who wish to pursue these majors attend Gompers. Thus, there is a cross section of students from various social and economic backgrounds. The counselor recommended students he considered to have the potential for careers in science, provided they were given the right exposure. His consideration was based on personal knowledge of the students (their interests, grades, test scores, etc.). Each of the students recommended is considered to be socially and/or economically disadvantaged.
- e. Mentor guidance of apprentices: The mentors were selected on the basis of their interest in the program, their willingness to provide the individual attention necessary to guide the apprentices, and their ability to function as role models. Particular attention will be given to regular evaluation of the apprentices, and additional assistance will be provided where areas of weaknesses are identified. Mentors will provide outside enrichment activities as opportunities occur. These will be in addition to those scheduled for the apprentices as a group. (See paragraph f.)
- f. Group activities planned for apprentices: An increased understanding and appreciation of career opportunities in the science disciplines can be achieved by providing the apprentices meaningful experience. Initially the apprentices will be given a general orientation to the Center and world of work (importance of getting to work on time, proper way to answer the telephone, need to request leave in advance, steps in carrying out an assignment, goal setting, etc.). In addition, the Center will schedule field trips to the following research and development/educational organizations: Southwest Fisheries, NOAA, NOSC, University of California at San Diego, San Diego State University, Linkabit Corporation (satellite communications), Courseware Cor-

poration (program learning/instructional design), and Navy Ships. Also, weekly seminars will be held to acquaint apprentices with the functions of various groups on Center. These will provide the students opportunities to interact with Center professionals' staff members who have the capability to communicate with students and who are knowledgeable of Center projects. Such interaction is essential for individual development and growth of the apprentices.

g. Evaluation of apprentices and mentors: The mentors will prepare training plans and identify specific performance factors, stressing work behaviors. The plans will be reviewed by a third party to ensure realistic requirements. The mentors will discuss the plans with the apprentices, keeping in mind their age, development, and need to become familiar with the world of work. The most important aspects at this stage are for the mentors and apprentices to develop communication, trust, and mutually understood expectations. On a quarterly basis the mentors will conduct formal reviews of the apprentices' progress. These reviews will be forwarded to Personnel and Management Services, Code 103, where they will be monitored for emerging problems. Code 103 will maintain continual contact with the mentors to assess their progress with the apprentices and periodically will query the apprentices themselves regarding perceptions of their assignments, orientation activities, communications with mentors, problems areas, etc.

h. Evaluation of apprentices' individual development: The mentors will become familiar with the apprentices' high school curricula and the curricula of local colleges and universities. This will enable the mentors to guide the apprentices in selecting and applying to those colleges which will meet their needs. Also the mentors will contact the high school counselors on a regular basis to discuss the apprentices' performance on the job and to keep abreast of their academic progress and development.

W. E. WILCOX
By direction

DEPARTMENT OF THE NAVY
NAVAL COASTAL SYSTEM, CENTER
Panama City, Florida 32407

From: Commanding Officer
To: Chief of Naval Material (MAT 08L)
Subj: Science and Engineering Apprenticeship Program; report on
Ref: (a) CHNAVMAT msg 211340Z May 80
(b) NCSC ltr Code 130: MAC of 28 May 80
Encl: (1) Progress and Prognosis of Science and Engineering Apprenticeship
Program

1. Enclosure (1) is forwarded as requested by reference (a), and supplements information provided by reference (b).

R.D. BENNETT

PROGRESS AND PROGNOSIS OF SCIENCE AND ENGINEERING APPRENTICESHIP PROGRAM

Four students were entered into the NCSC Science and Engineering Apprenticeship Program in the summer of 1980 as reported in reference (b). Due to the late date of selection, security clearances could not be obtained for the participants so that reassignment of two students was necessary. All assignments were made to areas that permitted both physical and informational access by uncleared personnel. Additionally, one student did not attain her sixteenth birthday until early July, so an exceptionally late reporting date was necessary. Final student, mentor, and work assignments were as follows:

Student: LINDL, Bruce A.

Mentor: PRESTON, James E.

Assigned to Mechanical Engineering tasks; made simple drawings and simple designs; followed work through shop construction and final installation.

Student: TELFARE, Jeffrey A.

Mentor: QUIRK, John

Assigned to Mechanical Engineering tasks; made simple drawings and designs; performed device testing; data processing; computer programming.

Student: RAIFORD, Angela

Mentor: LOFTIN, Horace G.

Environmental monitoring and analysis; water quality sampling; field data collection; data analysis; computer programming.

Student: HARVEY, Rhonda C.

Mentor: CASTELIN, Stephen F.

Field support engineering tasks; electronic and optical tracking of surface and air craft; field instrumentation; computer programming and data processing.

Organizational meetings were held with mentors to assure all were fully indoctrinated on program objectives; frequent contact of mentors by program coordinators assured smooth program operation. Monthly meetings were held with program coordinators and students in which experiences and ideas were exchanged. These meetings established good communications and identified potential problem areas before problems arose.

Each student was required to write a report on his/her work, and all reports indicated a very successful program start. The following quote from one report exemplifies the feeling expressed by all.

"The most satisfying and maybe the most important experience of the entire summer session (and maybe the most important experience in my life!) took place during my second project. I found out about the work of a mechanical engineer. The act of watching what started out to be an idea, turn into a reality. It was the most delightful type of work I've ever done."

All four students have returned to school and will contact the program coordinators when their schedules are firmly established. Work/school schedules will then be established in consultation with student and mentor. Each mentor will maintain close contact with his assigned student.

Plans for program continuation include:

- a. Continue present students in the program through the next summer work period.
- b. Select 3-4 new participants for entry into the program next summer.
- c. Continue the established procedures for selection of students and mentors.
- d. Make student selections in sufficient time to allow for acquiring security clearances.

The program is well founded and appears to be meeting the stated objectives. Continuation with minimum change is anticipated.

DEPARTMENT OF THE NAVY
NAVAL WEAPONS CENTER
China Lake, Ca 93555

25 September 1980

From: Commander, Naval Weapons Center (Code 092)
To: Chief of Naval Material (MAT 08L2), Department of the Navy,
Washington, D.C. 20360

Subj: DoD Science and Engineering Apprenticeship Program

Ref: (a) CNM ltr 08L2/WBC Ser 251 of 22 May 1980

Encl: (1) Mentor's Evaluation of Apprentice
(2) Apprentice's Evaluation of Training

1. As requested by reference (a), the following information and evaluation relative to the implementation of the DoD Science and Engineering Apprenticeship Program at the Naval Weapons Center (NWC) is submitted.

2. In an effort to reach the students who were potentially eligible for this program, the Program Coordinator (a Personnelist) went to each high school in the local area (including Trona - approximately 22 miles away) and provided them with information concerning the program and the program requirements. Each of the schools was requested to refer names of the students who had been identified as having special interest, aptitude or potential in the area of science or engineering. Those identified students were then asked to complete a Standard Form 171 and a Background Questionnaire. The questionnaire was designed to elicit information that would have a bearing on whether a student met other qualifying program requirements such as economic criteria and parents' Employment status with the government (Navy). Furthermore, the California Employment Development Department Office in Ridgecrest was contacted for names of applicants who met the economic criteria and were not the sons/daughters of a Navy employee.

All candidates were interviewed by a panel composed of an Equal Employment Opportunity (EEO) representative, a Personnel Department representative (the Program Coordinator), and a Senior Manager from the Scientific and Engineering community. At this time, the student was briefed on the program objectives and requirements.

3. Fifteen students were identified as having met all program requirements and were selected. At that point, mentors were selected based on several factors. Initially, the interest and academic background of the student was considered. Mentors in appropriate fields were interviewed and selected based on their interest and support of the program. Fifteen mentors were selected.

4. Apprentices periodically attend briefings on hiring/training programs such as Junior Professional Program and the Cooperative Education Program. As

time permits, they are encouraged to attend training workshops and classes at NWC relevant to their academic study and work. Career Counseling is offered by both the Personnel Department and the mentors. Additionally, all students can receive tutoring from their mentors.

5. Enclosure (1) and (2) are the evaluation forms used by the mentors and trainee. They are submitted to the Program Coordinator quarterly. The Program Coordinator maintains a liaison with the local high school's Dean of Students or Principal for such things as recruiting students, academic standing of current apprentices, review of apprentice's evaluations, etc.

6. The apprentice's work/study program will be carefully tracked by use of supervisor's evaluations, trainee's evaluation, academic standing in school and career counselors. After working the summer, after high school graduation, apprentices will be employed only during the summers between college breaks, unless the apprentice remains in the area and attends the local Junior College. All continuing apprentices will be required to submit college transcripts periodically. For those apprentices who do not return, we will ask that the students stay in contact with this office for evaluation purposes.

7. An overall review of the recruiting, selection, training and evaluation methods shows a very positive work/study program. The students are enthusiastic and the mentors are very supportive. However, we have experienced some problems in recruiting students who are not the sons or daughters of a Navy employee and who meet all other program requirements. The Ridgecrest/China Lake community is relatively isolated. In our commuting area (50 miles) there are four high schools. Trona High Schools is 22 miles away. Burroughs High School is the major high school with a student population of 1279. Eight hundred ninety seven (70%) of the students are the sons or daughters of a Navy employee. The nepotism regulation automatically disqualified most of the students who otherwise met all other program requirements, including economic criteria. This also eliminates many minorities and women. NWC currently has a request for a waiver of the nepotism regulation at the Office of Personnel Management (OPM) Regional Office in San Francisco. This waiver would allow for the selection of students who clearly meet all program requirements and the intent of the program.

8. Please contact Head, Employment-Wage and Classification Division if you have any questions. Mr. Martineau's telephone number is AUTOVON 437-3590.

MARCEL MARTINEAU
By direction

HIGH SCHOOL RESEARCH APPRENTICESHIP PROGRAM

NAME: _____ DATE _____

CODE: _____

SUPERVISOR: _____

Reporting period from _____ to _____

1. List assignments or projects given: _____

2. List specific instruments, machines, tools, manuals, etc. that you have become familiar with:

3. COMMENTS (about your training or assignments given):

SIGNATURE: _____

Enclosure (2)

NAVAL OCEAN SYSTEMS CENTER
San Diego, Ca 92152

20 October 1980

From: Commander, Naval Ocean Systems Center
To: Chief of Naval Material

Subj: Progress and Prognosis of Science and
Engineering Apprenticeship Program; report of

Ref. (a) CHNAVMAT msg R2113402 May 80

1. As required by paragraph 5 of reference (a), the following information is provided:

a. Progress. To date, 21 students from the San Diego and surrounding communities have been interviewed. Of those 21 students, 7 were male (2 Blacks, 3 Hispanics, 1 Asian), and 14 were female (6 Blacks, 2 Hispanics, 2 Asians and 4 Caucasians). Ten offers of employment were made with all ten accepting (3 male, all Hispanics), and 7 female (3 Blacks, 2 Hispanics, 1 Asian and 1 Caucasian). Five additional offers are pending further interviews. Of the ten students accepting, four have reported aboard (25 September) and six are completing the pre-employment security clearance processing. The overall quality of the students referred by the schools, in terms of scholastic achievement and interest in the math and science has been extremely high. We are confident that the remaining five vacancies will be committed very shortly.

b. Prognosis. The most formidable problem at hand is transportation, or the lack of it. Logistics, in terms of location of the schools, the time the students finish classes and the public transportation schedule, do not permit high school students sufficient time to work (1-1 1/2 hours per day). For many, the effort in getting to the worksite for such a short period of time is a hardship (the trip by public bus may take as long as 2 hours). It is anticipated that the majority of apprentices will be employed exclusively during holidays and vacation periods. The effect of such an employment schedule over the long term will have to be analyzed. Efforts are, however, being made to arrange transportation from one of the schools with the help of the school district.

It was our intent on this first go around to select students at various class levels (sophomores, juniors and seniors) in order to provide a cross section of skill levels and to provide opportunities to work with students over a long period of their high school years. Of the ten students selected, 4 are seniors, 4 are juniors, and 2 are sophomores.

We are optimistic also that the contacts that have been made with school personnel, special program personnel and community groups will continue to produce an adequate supply of quality students for our program.

2. Questions concerning any of the above information may be referred to me at Autovon 933-6848, or to Ms. Christine Callesen at Autovon 933-7201.

Jewell L. Rader
By Direction

NAVAL OCEAN SYSTEMS CENTER
San Diego, Ca. 92152

1 July 1980

From: Commander, Naval Ocean Systems Center
To: Chief of Naval Material (MAT 08L)

Subj: Report on DoD Science and Engineering Apprenticeship Program

Ref: (a) CNM msg 211340Z May 80

Encl: (1) Mentors' Profile Information

1. In response to reference (a), the following information is provided:

- a. Number of spaces allocated to NOSC: 15
- b. Number of selectees to date: 0
- c. It is anticipated that these positions will be filled by 15 July 1980.
- d. Number of mentors delegated: 13
- e. Mentors positions will be filled prior to selection of students. The information requested by paragraph (4) of reference (a) will be provided when these additional mentors are selected.
- f. Procedures used to select students and determine their interests and attitudes:

(1) Initially a survey was conducted of those students currently employed with the Center under the Stay-In-School Program. Of the approximately 70 students onboard, 25 met the program criteria, however, only 4 indicated an interest in science or engineering careers. The students' supervisors were then contacted for appraisal of the students' potential for a science or engineering career. Factors taken into consideration included courses the students have completed or plan to complete before graduation, interests in school, overall grade point average as an indicator of success/interest in school, the supervisors' observations concerning reliability, dependability and potential for pursuing a college degree.

(2) We have also contacted the Bandini Youth Employment and Training Center, Career Development Services, San Diego Schools; outlined the program and generally specified the requirements for students to be considered. The Bandini Center staff is presently in the process of screening students for referral as well as soliciting referrals from individual school counselors. We expect the majority of referrals will be from Gompers High School which specializes in mathematics science and computer science curricula. This

school alone will provide a cross section of students from various social and economic backgrounds. Under the magnet school system, students from anywhere in the city may attend Gompers. Recommendation/referrals will be based upon the students' interest, grades, test scores, etc.

g. Mentor guidance of apprentices: The mentors were selected on the basis of their interest in the program, their willingness to provide an individualized working relationship with the assigned apprentice, to oversee the trainees' work assignment, provide enrichment activities counsel the trainee for college entrance through to graduation, and their ability to function as a role model for this student. Particular attention will be given to regular performance evaluations of the apprentices, and additional assistance will be provided where areas of weaknesses are identified. Mentors will provide additional information/input as required for scheduled group sessions.

h. Group activities planned for apprentices: Initially the apprentices will be given a general orientation to the Center and world-of-work. The Center will schedule group meeting, tours and field trips. Periodically seminars will be held to acquaint the students with the functions of the technical and scientific organizations at NOSC. These seminars will also provide the apprentices an opportunity to interact with Center scientific/engineering members who are knowledgeable of Center projects and have the capability to communicate effectively with these youth.

i. Evaluation of apprentices and mentors: The mentors with assistance from the Employee Development Division will prepare an individualized training plan for his/her assigned apprentice. The plan will be rather specific covering such items as tasks to be performed, providing adequate timeframes for both on-the-job training and work experience. The plan will also list features of performance that will be expected. The most important aspects during this FY will be for the mentors and apprentices to develop communication, trust, and a mutual understanding of their individual expectations. On a quarterly basis the mentors will conduct a formal review of the apprentice progress. These evaluations will be reviewed by the Program Chairman, where they will be monitored for potential problems and guidance will be provided for their correction. The Program Chairman will maintain continual contact with the mentors to assess their progress with the apprentices and the program. At least quarterly the Chairman will meet with the individual apprentice and query them regarding their perceptions of their assignments, the various training sessions, rapport with mentors, and problems, etc.

j. Evaluation of apprentices' individual development: The mentors will become familiar with the apprentices' high school curricula and graduation requirements as well as with admission requirements and curricula of local college and universities. This will enable the mentors to help guide the apprentices in selecting and applying to those colleges which will best meet their needs. The mentors, will, as part of the quarterly evaluation, contact the highschool counselor to keep abreast of their academic progress and development and to discuss the apprentices' performance on the job. Mentors will be encouraged to foster a close working relationship with counselors in tracking the apprentice's development.

k. Mentors' Profile Information: See enclosure (1). The information requested by paragraph 3 of reference (a) will be provided when selections are made.

2. Since the overall long-term objective of the science and engineering program is to provide government RDT&E activities with a more ethnically balanced pipeline for the input of junior professionals, it seemed appropriate to NOSC that an official committee should be appointed. A NOSC Science and Engineering Apprenticeship Program has been officially established with the appointment of a Chairman, Dr. John Silva. He will be responsible for the organization and direction of this program including: (a) recruitment, (b) counseling, (c) orientation, (d) task selection, (e) performance evaluation of trainees, (f) monitoring and tracking individual development and academic careers; and (g) assessment of the program's effectiveness.

Dr. Silva will be assisted by the Mentors, the Program Coordinator, the Employee Development Branch, the Deputy Equal Employment Opportunity Officer/ Staff; and other Center officials as required to accomplish the Program's charter. Dr. Silva's profile is: Supervisory Electronics Engineer, GS-855-14, Head, Man-Systems Interaction Division, Code 823, PhD Engineering Science.

W. R. RILEY
By direction

MENTOR'S PROFILE INFORMATION

<u>Name</u>	<u>Series/Grade</u>	<u>Title</u>	<u>Code</u>	<u>Highest Degree Held</u>	<u>Academic Field of Degree</u>
Meyor Lepor	1310/12	Physicist	5121	MS	Physics
David Lambert	1310/11	Physicist	5121	BS	Mathematics
Marion McCord	1310/12	Physicist	5212	BS	Physics
Arturo Arriola	855/11	Electronics Engineer	5213	BS	Electronics Engineering
Richard Petty	855/14	Head, Senior Processing & Analysis Div.	732	No Degree	
Marion Bryant	855/13	Head, Electronic Warfare Sys. Br.	8213	MS	Electronics Engineering
Joseph Loughlin	855/12	Electronics Engineer	8112	MS	Mathematics
Robert Crabb	344/14	Head, Advanced Systems Group	9134	BS	Mathematics
Dough Hamaguchi	1520/12	Mathematician	9134	BS	Mathematics
Frederick Heid	855/13	Head, System Test Branch	9333	BS	Electronics Engineering
Robert Leffler	855/12	Electronics Engineer	9333	BS	Electronics Engineering
Terry Danielson	855/12	Electronics Engineer	9332	BS	Electronic Engineering
Charles Chun	830/11	Mechanical Engineer	9314	MBA	Mechanical Engineering